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Note.—Initialled abstracts are written by the following:

Mr C. M. Driver	C. M. D.
Dr S. Ellerton	S. E.
Dr H. Fox	H. F.
Mr J. L. Fyfe	J. L. F.
Dr J. G. Hawkes	J. G. H.
Mrs R. M. Ingham	R. M. I.
Dr J. O. Irwin	J. O. I.
Mr I. Zacopanay	I. Z.

* General studies, see also individual crops.

Plant Breeding Abstracts.

Vol. XIV, No. 4.

Part I. Empire Section

BREEDING 575

1054.

575:633

Application of genetics to plant and animal breeding.

Nature, Lond. 1944 : 153 : 780-83.

This symposium included the following items of interest to plant breeders:—

M. B. Crane

The importance of taxonomic and phytogeographical studies is urged. Breeding new varieties of plants resistant to diseases and pests is one of the best methods of control. Polyploidy has a wide application in the improvement of fruit trees.

H. G. Champion

Forestry has been ignored almost entirely by British geneticists and breeders although almost all the economically important characters of forest trees are genetically controlled. Commercially valuable hybrids of *Populus* and *Larix* are available. The difficulties peculiar to forest tree breeding were shortly reviewed.

T. J. Jenkin

The aim of herbage breeders is the production of a persistent and productive sward that will stand up well to continuous grazing. Most of the characters contributing to this end are extremely complex and only studied with difficulty by the methods of formal genetics.

G. D. H. Bell

There is a pressing need for a detailed genetical analysis of the economically important characters of crop plants. The difficulties of field selection were discussed.

K. Mather

Most of the important economic characters of crop plants are determined by polygenes. It is necessary therefore to employ the statistical and genetical techniques developed for analysing such factors.

S. Ellerton

The attitude of breeders who believe that highly bred plants are approaching their "genetical limit" is deprecated. Heterosis has led to greatly increased yield both in maize and wheat.

W. J. C. Lawrence

It is important to select crop plants for efficiency in absorbing specific nutrients.

F. Yates

New varieties of crop plants must be tested under a wide range of environmental conditions before being introduced.

C. D. Darlington

The points made by previous speakers were reviewed and the spheres of interaction of the statistician, cytologist and geneticist discussed.

1055.

575:633(94)

Report of the Waite Agricultural Research Institute, South Australia 1941-1942 (1943) : Pp. 84.

Wheat

Two new strains of wheat, 38-356 and 39-129, resistant to stem and leaf rusts and flag smut were selected for the 1942 county trials. They were derived from the cross Nabawa x (Riverina x Hope) and compared favourably with the new variety Warigo. Promising rust resistant types derived from Kenya C.6042 and C.6040 were also included in the trials.

The rust resistant types produced by repeated back crossing of Gluyas-Hope to Ghurka and Raneer are being tested against the parent types. Nabawa x Hard Federation (39-453), although non-resistant, showed promise as an early maturing wheat.

Various foreign wheats have been tested for their resistance to disease under South Australian conditions.

Two different genes for resistance to *Puccinia graminis Tritici* from Eureka and Warigo respectively, namely that conferring "physiologic resistance" and that for "mature plant resistance" have been combined in one plant.

Many Australian wheat varieties have been shown to be resistant to loose smut. In breeding for resistance to bunt two wheats, Rio and Oro, which possess the resistant genes *R* and *T* respectively, have been selected as parents.

Flax

Breeding work in this field has recently commenced and single plant and mass selections have been made in an attempt to isolate superior strains. The variety Concurrent was compared with Certified White Dutch which was found to be slightly superior to it.

Linseed

The rust resistant variety Walsh is being crossed with the high yielding Punjab in order to combine the desirable qualities of both types.

Tomatoes

Disease resistant selections have been back-crossed to the Early Dwarf Red variety.

Beans

Studies of the inheritance of resistance to halo blight have revealed that there are at least two genes determining resistance to *Phytophthora Medicagois phaseolicola*. Resistant types have been isolated from a Canadian Wonder x Burnley Selection cross.

1056. RAMANUJAM, S. 575:633:575.1(54)
Genetical research as applied to plant breeding in post-war India.
 Curr. Sci. 1944 : 13 : 63-65.

The results obtained by applying the principles of genetics to plant breeding are briefly reviewed. An account follows of the present position of Indian plant breeding research and recommendations for future development are suggested.

GENETICS 575.1

1057. KADAM, B. S. 575.113:519.24
Tables of theoretical frequencies of common Mendelian ratios for $n = 1$ to 500 with limits of deviations.
 Poona Agric. Coll. Mag. 1944 : 35 : 60-71.

Theoretical frequencies for the numbers from 1 to 280 are given for the common Mendelian ratios 1 : 1, 3 : 1, 9 : 7, 15 : 1, 13 : 3, 27 : 37 and 63 : 1. A column gives the limits of deviation for each ratio, calculated as twice the standard error.

1058. WIGAN, L. G. 575.113.5
Balance and potency in natural populations.
 J. Genet. 1944 : 46 : 150-60.

The concept of potency is introduced for the study of polygenic balance in natural populations. It is defined as the effect of the integrated dominance and interaction relations of all the polygenic allelomorphs within the possible combinations. If AA, AB, and BB represent two homozygotes and the intermediate heterozygote, the potency of A is measured by $\frac{BB - AB}{BB - AA}$. It is possible that AB may be greater or less than both AA and AC, in which case heterosis obtains. *Drosophila* experiments are described to demonstrate the interaction between potency, natural selection and mating system.

1059. AYACHIT, G. R. 575.12:575.143:519.24
Progress of homozygosity due to backcrossing.
 Curr. Sci. 1944 : 13 : 79-81.

The rate at which a back-crossed breeding population becomes homozygous is discussed mathematically.

1060. CRANE, M. B. 575.127.2:575.242:576.356.5:576.16
Cultivated plants of the past, present and future.
 Endeavour 1943 : 2 : 111-16.

A historical review is presented of the ways in which new varieties of plants have arisen. Selection of gene mutations (including somatic mutations giving rise to chimaeras), chromosome doubling, hybridization, and combinations of these methods, are treated in turn.

1061. WRIGHT, S. 575.17:575.182
The physiology of the gene.
 Physiol. Rev. 1941 : 21 : 487-527.

The term gene is used at present in two different senses, firstly for the units of heredity and secondly for circumscribed loci on the chromosomes. It is pointed out, moreover, that the number of gene loci in an organism is not indefinite.

Non-Mendelian heredity may prevail in the Bacteria and Cyanophyceae where nuclear organization is either absent or rudimentary. Cytoplasmic inheritance may be demonstrated in higher organisms by the differences found between reciprocal crosses but it is not always easy to distinguish such a mode of inheritance from the effects of virus infection or dauermodifications. Non-Mendelian heredity operates most frequently in interspecific or intergeneric crosses and is also found in some cases of merogonic hybridization.

The relative importance of the nucleus and cytoplasm in growth is discussed, also the causes of differentiation which are believed to reside chiefly in the cytoplasm.

In the second half of the paper, the following topics are discussed: (a) the relation between genes and enzymes, (b) the problem of factor interaction and mode of operation, with special reference to pigment determination, and (c) the significance of dominance and multiple allelomorphism.

1062. AUERBACH, C. and ROBSON, J. M. 575.243:581.04
Production of mutations by allyl isothiocyanate.
 Nature, Lond. 1944 : 154 : p. 81.

Allyl isothiocyanate, a naturally occurring compound in many of the Cruciferae, induces a slight increase in the mutation rate in *Drosophila*.

1063. MORGAN, W. T. J. 575.243:632.3
Transformation of pneumococcal types.
 Nature, Lond. 1944 : 153 : 763-64.

The literature relating to induced mutation in *Pneumococcus* is reviewed and it is concluded that the change of the R variant into the S strain is a genuine example of a controlled mutation which can be induced by a specific chemical agent.

ORIGIN OF SPECIES 576.1

1064. HALDANE, J. B. S. 576.12
Radioactivity and the origin of life in Milne's cosmology.
 Nature, Lond. 1944 : 153 : p. 555.

According to the cosmological theories of Milne, Eddington and Dirac, the fundamental parameters of physics vary with time. If Milne's theory is applied to biological systems, it would appear that the mechanical energy derivable from biochemical reactions also varies with time and that it was formerly much less than at present. Evolution of large and complex organisms, on this supposition, would be limited by the age of the universe, only becoming possible after sufficient time had elapsed to render effective an efficient transformation of chemical energy to mechanical.

CYTOLOGY 576.3

1065. POLLISTER, A. W. and MINSKY, A. E. 576.312:581.192:001.4
Distribution of nucleic acids.
 Nature, Lond. 1944 : 153 : p. 711.

A defence of the terms "chromonucleic acid" and "plasmonucleic acid" is presented in reply to the criticisms made by Gulland *et al.* (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 691).

1066. SHEFFIELD, F. M. L. 576.312.315
The nucleolus.
 Nature, Lond. 1944 : 153 : 687-88.

This brief review on the nucleolus includes a description of the modern theory of its formation. One or more chromosome pairs may carry nucleolar organizers from which nucleoli are produced at the end of telophase. Contact between nucleoli is followed by fusion so that by the following prophase, only one nucleolus usually remains. The number of nucleoli first produced is of considerable phylogenetic importance.

1067. DARLINGTON, C. D. and
MATHER, K.

576.356.5:576.16

Chromosome balance and interaction in *Hyacinthus*.

J. Genet. 1944 : 46 : 52-61.

An analysis of non-random segregation of chromosomes in the triploid of *H. orientalis* has been made, and it is concluded that "the statistical analysis of chromosome combinations in the pollen of triploids can be used as a means of finding out something of their physiological and evolutionary relationships".

BOTANY 58

1068. LEWIS, D.

581.162.5:575.113.3

Incompatibility in plants: Its genetical and physiological synthesis.

Nature, Lond. 1944:153:575-78.

Two types of incompatibility system in flowering plants may be recognized, those involving heterostyly and those not doing so. In the latter case, the genetical control of the incompatibility reaction is effected by genes of multiple allelomorphous series, any member of which is compatible with all alleles except itself. In most cases, the place of inhibition of the pollen tube is not localized but is determined by the time at which the products of the incompatibility reaction attain a threshold concentration.

Polyploid plants, in which interaction between the multiple allelomorphs occurs, exhibit a modified system since the gene interaction weakens the efficiency of the incompatibility reactions. Incompatibility with heterostyly involves only a few major genes, and plants, such as *Capsella grandiflora*, which are not heterostylic, are classed in this category, since their incompatibility system is similar. In contrast to the nice specificity of homostylic incompatibility systems, which appear to be determined by the immunity reactions of proteins, the heterostylic plants exhibit a variety of proximate causal mechanisms including, for example, a system of contrasting osmotic pressures, as well as the immunological type mentioned above.

FUNGOUS DISEASES 632.4

1069. CHEREWICK, W. J.

632.421.1:576.16:633.1(71)

Studies on the biology of *Erysiphe graminis* DC.

Canad. J. Res. 1944 : 22 : Sect. C:52-86.

This general account of the biology of *E. graminis* includes a description of Canadian physiological forms. Three new races, 8, 9 and 10, of *E.g. Hordei* are described, the differential hosts being Black Hulless, Chevron, Goldfoil, Heil's Hanna, Nepal and Peruvian. Race 1 was the only form of *E.g. Tritici* discovered. The barley races appear to be stable entities although some modification in the infective behaviour was obtained by inoculation and incubation at high temperatures.

Cross inoculation from one host species to another was generally impossible except in the case of a race of *E.g. Agropyri* (from *Agropyron repens*) which infected wheat, barley and rye.

In some instances at least, *E. graminis* is homothallic producing perithecia from monosporial cultures, but there are suggestions that combination and segregation may occur in the field.

CEREALS 633.1

1070. MOORE, W. C.

633.1-2.4:576.16:575

Cereal diseases.

Nature, Lond. 1944 : 154 : 139-41.

This article reports the proceedings of a meeting of the Association of Applied Biologists and contains short references to the importance of physiological specialization in breeding for rust resistance and the general utility of breeding as a method of combating disease.

WHEAT 633.11

1071. SIMS, H. J. and

633.11:575(94.5)

WEBB, C. G.

633.13:575(94.5)

Cereal trials in the Mallee.

J. Dep. Agric. Vict. 1944 : 42 : 101-7.

Varietal tests of wheat and oats in the Mallee are reported and three recently named varieties described. Pindar, a wheat selection from Ghurka, has better flour quality than its parent, while Quadrat, from Ghurka x (Currawa x Major x Gallipoli) has a higher yield than Ghurka. Algeribee is a new oat selected from Algerian which it exceeds in yield.

1072.

ZHEBRAK, A.

Synthesis of new species of wheats.

Nature, Lond. 1944 : 153 : 549-51.

633.11:575.127.2:575.129:581.04

633.11:582:001.4

Theoretical considerations suggest that the most promising field in the development of new wheat varieties is the utilization of types with high chromosome numbers. Amphidiploids have been obtained by means of the colchicine technique from the following hybrids: *T. durum* Desf. x *T. monococcum* L., *T. polonicum* L. x *T. durum*, *T. durum* x *T. Timopheevi* Zhuk., *T. persicum* Vav. x *T. Timopheevi*, *T. polonicum* x *T. Timopheevi*, *T. orientale* x *T. Timopheevi*, *T. vulgare* x *T. Timopheevi* and *T. durum* x *T. vulgare*.

The 42-chromosome amphidiploid from *T. durum* x *T. monococcum* has been named *T. Edwardi*; all the 56-chromosome hybrids derived from crosses involving *T. Timopheevi* are classed under *T. soveticum* [= *T. sovieticum*] and the 70-chromosome plants of *T. vulgare* x *T. Timopheevi* are classified as *T. Borisovi*.

Short descriptions of these amphidiploids are presented and their promising qualities for breeding projects discussed.

1073. BIRDSALL, J. E. and

NEATBY, K. W.

633.11:581.49:631.557

633.11:581.49:664.641.016:576.312.35

Researches on drought resistance in spring wheat. III. Size and frequency of stomata in varieties of *Triticum vulgare* and other *Triticum* species.

Canad. J. Res. 1944 : 22 : Sect. C : 38-51.

Varietal differences in stomatal size and frequency have been established together with a positive relation between stomatal size and chromosome number. Stomatal size and frequency are negatively correlated; yield and stomatal frequency appear to be positively correlated, yield and stomatal size and protein content and stomatal frequency negatively correlated.

1074. ELLERTON, S.

633.11-2.421.1-1.521.6(42)

Reaction of wheat varieties grown in Britain to *Erysiphe*.

Nature, Lond. 1944 : 153 : 776-77.

Details of the varietal resistance of 15 wheat varieties to *E. graminis* are presented.

1075. SMITH, W. P. C. and

MILLINGTON, A. J.

633.11-2.452:576.16:631.521.6:575.12(94)

Stem rust of wheat and its control by breeding resistant varieties.

J. Dep. Agric. W. Aust. 1944 : 21 : 1-16.

The history of wheat breeding in Australia is outlined with special reference to the problem of resistance to *Puccinia graminis Tritici*. There have been several changes in the distribution of important rust races, Nos 34 and 43 being the only two so far identified from West Australia.

Kenya C.6041 has been crossed with Sword and one promising line, M.60, is being developed. It is hoped that it will be possible to combine the Hope type of "mature plant" resistance possessed by Warigo with the Kenya type of resistance which is effective at all stages in development.

OATS 633.13

1076. PATEL, N. M.

633.13-2.451.2-1.521.6:575.061.6:575.114

Independence in inheritance of the loose smut reaction and lemma colouration in an oat cross.

Bot. Ser. Bull. Inst. Agric. India 1943 : No. 1 : Pp. 27.

Genetical studies with the red-glumed smut-resistant variety Victoria and the black-glumed susceptible variety Victor show that reaction to smut and the coloration of the glumes segregate independently. The genes for smut resistance and black lemma act as dominants over those for susceptibility and red lemma colour respectively.

RYE 633.14

1077. SIMS, H. J.

633.14-1.524:575.41(94.5)

Ryecorn—a cereal for winter grazing and drift control in the Mallee.

J. Dep. Agric. Vict. 1944 : 42 : 151-54, 162.

This article includes a description of the variety Victorian Malee, an early rye of unknown origin probably originating locally after a long period of natural selection.

MAIZE 633.15

1078. STEVENSON, G. C. 633.15:575.42(69.82)
Notes pratiques sur l'amélioration du maïs par la sélection. (**Practical notes on the improvement of maize by selection**).
Rev. Agric. Maurice 1944 : 23 : 21-25.

The method of field selection is described and the criteria by which suitable maize plants should be chosen are outlined.

BARLEY 633.16

1079. ANSARI, M. A. A. 633.16:581.6(54.3)
Improved barley.
Indian Fmg 1943 : 4 : 569-70.

The botanical characteristics, yielding ability and malting quality of the variety C.251 are described.

ROOTS AND TUBERS 633.4

1080. MOREAU, R. E. 633.491:581.05(67.61)
The climatic background to the problem of potato varieties for East Africa. Part II.
E. Afr. Agric. J. 1944 : 9 : 203-12.

This article concludes the author's discussion on the climatic adaptability of potatoes (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 725).

It is believed that the long day adaptation of *Solanum tuberosum* has not been adequately established and that the suggestion of replacing it in East Africa by species of the *S. andigenum* complex is inadvisable. *S. phureja* may however be useful on account of its heat enduring properties and high protein content.

1081. BALD, J. G. and
HELSON, G. A. H. 633.491-2.7-1.521.6
Estimation of damage to potato foliage by potato moth, *Gnorimoschema operculella* (Zell).
J. Coun. Sci. Industr. Res. Aust. 1944 : 17 : 30-48.

Varietal differences in resistance to potato moth are attributed not to differential palatability, but to the capacity for replacing destroyed foliage by the development of axillary shoots.

FIBRES 633.5

1082. 633.51:575
Progress reports from experiment stations. Season 1942-1943.
Programmes of experiments. Season 1943-1944.
Emp. Cott. Gr. Corp. Lond. 1944 : Pp. 181.

Wells, W. G. Queensland. Cotton Research Station, Biloela. (pp. 1-16).

Two types of jassid-resistant cotton have been produced, namely, 41.J, which is a slightly resistant Miller bulk selection, and III-26, a resistant pure Miller strain. The latter, although possessing many advantages, has a rather uniform lint length of only $\frac{15}{16}$ " to 1". Three hybrids selected from (Miller x U.4) x Miller back-crosses are very jassid resistant and fairly uniform.

Selections from the Cliett strain showed little promise of yielding a commercial fibre. The jassid susceptible variety New Mexico Acala is being incorporated in the programme for jassid resistance owing to its popularity, and is being crossed with several Miller varieties.

Parnell, F. R., South Africa. Season 1942-43. Cotton Experiment
MacDonald, D., Station, Barberton. Progress Report for the season
Ruston, D. F. and 1942-43. (pp. 17-37).
King, H. E.

Work was continued with the crosses U.4, 5143 x Cambodia, U.4 x M.U.8 and M.U.8 x 8161 with the object of selecting for high yield, ginning percentage, seed weight, lint length and hair grade.

Quality crosses were made in an attempt to obtain types possessing good field characters, a high degree of hairiness and a better quality lint than it is possible to obtain within the U.4. family.

For this purpose U.4 and M.U.8 were crossed with the following *Gossypium hirsutum* varieties: Cokers Wild's, Tidewater, Meade and Uganda. Sea Island and Egyptian strains were also used. Data are presented to show that the degree of jassid resistance can be estimated from an analysis of the hairiness of the plants under consideration, the more hairy plants showing a higher degree of resistance. It is thought that hairiness is the actual cause of jassid resistance and that leaf pilosity is more important in this respect than that of the stem.

Lochrie, J. V.

Swaziland. Cotton Experiment Stations, Bremersdorp and Croydon. Progress Report for the season 1942-43. (pp. 38-51).

Cotton strain trials were unfortunately invalidated owing to a particularly heavy attack of boll-worm.

Cameron, G. S.

Southern Rhodesia. Cotton Breeding Station, Gatooma. Progress Report for the season 1942-43. (pp. 52-56).

The new strain 9L34 shows considerable promise and is said to be quite prolific, producing lint of good length and character. Certain 7C crosses that showed marked jassid resistance have been retained for future work.

Anson, R. R.,
Knight, R. L. and
Evelyn, S. H.

Anglo-Egyptian Sudan. Progress Report of the Plant Breeding Stations, Season 1942-43. (pp. 57-90).

At the Gezira Research Farm selection work was started with a view to obtaining improved strains of Domains Sakel, using D.8.S.F., the present commercial type.

Hairy strains of X 1530 were shown to possess a high jassid resistance. Selections were also made with the blackarm resistant form X 1730 L and N.T. 2/40. The latter was inferior to N.T./41 and was therefore discarded.

The derivatives of X 1730, A, G, H and J, were shown to be more highly resistant to leaf curl than their original parent, X 1730. The N.T. series were highly resistant, including N.T.2/38, N.T. 2/39 and N.T.97/40.

Breeding for blackarm resistance was carried out at the Shambat experimental station. The American blackarm resistance factor B_2 has been introduced into the N.T.2 type of cotton, whilst the B_3 factor from *G. punctatum* is being introduced into the N.T.2 and X 1730 types. The latter types were not affected in yield or ginning out-turn by the addition of B_2 or a *G. arboreum* gene which produced reddish flowers.

The transference of blackarm resistance from *G. sanguineum* to N.T.2 was carried out to the second backcross stage on a small scale. B_2 and B_3 were transferred to XA.129 and Deltapine, and B_3 to 511 D.

The following species were tested for blackarm resistance: *G. tomentosum*: fully susceptible; *G. religiosum* (Bakatuka) showing a wide range; *G. barbadense* (var. Carpulla): fully susceptible; *G. Darwini*: resistant; *G. Thurberi*: susceptible; *G. Harknessii*: resistant, but contained an off-type fully susceptible plant which later died; *G. Davidsonii*: resistant, *G. Stocksii*: susceptible; *G. armourianum*: resistant; *G. Raimondii*: resistant (one plant only raised).

G. Thurberi, a wild Mexican cotton, has been crossed with Sakel in an attempt to transfer its bollworm immunity.

At the Kadugli station work is in progress with N.T.205/41 (a single-plant selection from S.P.20 Uganda) which combined blackarm resistance, jassid resistance, earliness and quality with a moderately high ginning out-turn and high seed cotton yield. Selection work is continuing with N.T.58/39, an early Punjab out-cross.

At the Equatoria station the following strains were incorporated in variety trials: X.A.129, S.P.84, N.T.43/37, 511E, X.A.129, 511D, Deltapine and N.T.58/39. A preliminary investigation on blackarm resistance was also carried out.

Hansford, C. G. and
Jameson, J. D.

Uganda. Cotton Experiment Stations, Kawanda and Serere. Progress Reports for the season 1942-43. Kawanda Zone. Serere Zone. (pp. 91-104).

Cotton breeding in the Kawanda zone was chiefly designed to improve the strain BP.52 in relation to blackarm disease, and several promising selections have been made.

Blackarm resistance is also being dealt with in the Serere zone by crossing BP.52 with the resistant strain N.17, and selecting a serviceable resistant hybrid for immediate purposes.

Miller, R. W. R. and Tanganyika Territory. Progress Reports on cotton
Peat, J. E. work 1942-43. Ukiriguru Experiment Station. Pro-
gress Report for the season 1942-43. (pp. 105-114).

Work at the Ukiriguru station is chiefly concerned with jassid resistance, crop yield, plant vigour and lint quality, combined with a reasonable ginning out-turn. Selections from material of "local" origin show promise.

Ducker, H. C. and Nyasaland Cotton Experiment Stations. Domira Bay
Miller, W. L. Station, Progress Report, 1942-43. (pp. 132-63).

Two promising Crown Land selections, C.L.20 and C.L.119, were found to combine good jassid resistance with excellent lint and other good qualities. C.L.20, however, showed marked susceptibility to blackarm disease.

Voelcker, O. J. Nigeria. Introductory note on the objects of cotton
experiments and the major problems of cotton growing.
Progress Report on work on cotton in the Southern
Provinces for the season 1942-43. (pp. 164-67).

In the southern provinces selections for rough lint were made, most lines proving insufficiently hairy, whilst the remainder were inferior to the variety Ishan A in halo length and ginning percentage.

Hutchinson, J. B. and West Indies. Cotton Research Station, Trinidad.
Stephens, S. G. Genetics Department. Progress Report for the period
October, 1942-September, 1943. (pp. 168-71).

Anthraxose resistance was found in a batch of (Sea Island x U.4) x U.4. back-cross material of predominantly U.4 character. It is considered that resistance could be transferred from Sea Island to Upland cottons without difficulty.

Genetic work on leaf shape indicates that leaf shape modifying genes control fundamental plant processes, such as time of flowering and rate of growth, the latter having a considerable selective value on their own account.

Cytological investigations are proceeding with an allotriploid (tetraploid *G. arboreum* x *G. anomalum*) with $2n = 39$, and an amphidiploid (*G. arboreum* x *G. anomalum*) with $2n = 52$. The amphidiploid crosses readily with New World cottons and with tetraploid *G. arboreum*.

Hybrids have been obtained between the American diploid *G. Raimondii* and a series of Asiatic types carrying different leaf shape alleles. An attempt is now being made to synthesize amphidiploids by colchicine treatment of these hybrids. If successful, the amphidiploids obtained should furnish an interesting comparison with New World cottons, and provide useful material for testing homologies between Asiatic and New World leaf shape alleles.

Manning, H. L. Cotton Experiment Station, St Vincent. Progress
Report for the season 1942-43. Programme of experi-
ments for the season 1943-44. (pp. 174-81).

Re-selections of VH.8 from (39)7 bulk provided material for progeny tests showing high lint per boll and a large number of bolls per plant.

Individual progenies of VH.10 show great promise; they possess in the main a low bolling frequency, a low number of seeds per boll and abundantly linted seeds.

1083. SETHI, B. L. and
ANSARI, M. A. A. 633.51:575(54.3)
Improved types of cotton in the United Provinces.
Indian Fmg 1943 : 4 : 461-62.

C520 is a single line selection from material introduced from the Saharanpur and Rohilkhand tracts; it is early, hardy and yields well. Perso-American is a single line selection of *G. hirsutum* material imported from Persia; it is characterized by high yield, earliness and superior quality.

1084. SILOW, R. A. 633.51:575.116.1.061.6:575.113.5
The inheritance of lint colour in Asiatic cottons.
J. Genet. 1944 : 46 : 78-115.

Three loci L_c , L_{c_2} and L_{c_3} carry the major genes determining lint colour in *G. arboreum* and *G. herbaceum*. Only one colour gene $L_{c_1}^*$ is known at the L_{c_1} locus and this induces khaki coloration. At L_{c_2} , a multiple allelomorph series occurs, viz. $L_{c_2}^*$, $L_{c_2}^a$, $L_{c_2}^b$ and l_{c_2} , the

colours produced being khaki, medium brown, light bright and white respectively. Lc_3^a is the only colour gene at the third locus and causes a light brown coloration similar to that produced by Lc_2^a . The various genes react cumulatively and the resultant modes of expression are indicated.

Lc_1 is linked with L , the cross-over value being 28.7% within *G. arboreum* and 24.5% in *G. arboreum* x *G. herbaceum*. Cu lies approximately midway between Lc_1 and L . Lc_2 is linked with H_a (7% cross-over) and Lc_3 with Y_a (24% cross-over).

In general, colour is associated with a decrease in lint length, a relation more likely physiological than a case of "true" gene pleiotropy. Seed size and lint quantity are less constantly associated with pigmentation, and here linkage with quantitative genes is assumed.

Lint pigmentation tends to be more frequent naturally in the presumed centres of origin of the species and is regarded as a primitive feature. The modifier complexes are particularly important and appear to have been built up, in part, by the action of human selection. Part of the distinction between high and low level modifying complexes appears to be due to the presence or absence of factors on the P_a chromosome. The data on the distribution of colour genes are compared with those elucidated for tetraploid New World cottons.

1085. SILOW, R. A. 633.51:576.16:575.113.5

The genetics of species development in the Old World cottons.

J. Genet. 1944 : 46 : 62-77.

The genetical variation within and between the species *Gossypium arboreum* and *G. herbaceum* is described. Artificial selection and geographical isolation have both contributed to the present diversity of races which differ *inter se* not so much in respect of major genes but in the possession of complexes of modifying genes. Sterility barriers between *G. arboreum*, *G. herbaceum* and *G. anomalum* are principally genetic and are brought about largely by the disintegration of the stable complexes of modifiers. There is no evidence, in the author's opinion, to support the postulate of macro-evolutionary steps in the interspecific differentiation of *Gossypium*. *G. arboreum* and *herbaceum* are admittedly incompletely intersterile, but such an indeterminate position in respect of specific status is explicable on the neo-Darwinian theory as an initial stage in the development of full specific differentiation.

An appendix is added describing the distribution, morphological characters and genetical features of *G. arboreum* vars *saudanense*, *indicum*, *burmanicum*, *cernuum*, *bengalense* and *sinense*.

1086. STEPHENS, S. G. 633.51:581.45:581.14:575.113.3:576.16

The genetic organization of leaf-shape development in the genus *Gossypium*.

J. Genet. 1944 : 46 : 28-51.

A comparative study has been made of the developmental patterns brought about by the action of the leaf shape genes (L^s), (L^o), (L^f), (l), L^A , L^B , L^I , L^N , L^R and l . Three phases of leaf development are recognized of which the first and third (phases A and C) are characterized by allometric growth, the developmental tracks constructed by plotting logarithmically the dimensions of fully expanded leaves at successive nodes on the main stem being linear. The slope of the developmental track (K) is unity in phase A and less than unity in phase C, each allele having a characteristic K value during this period. Phase B, during which compounding is initiated, is a period of transition and linear developmental relationships do not obtain.

Entire-leaved species remain in phase A during the whole of the pre-flowering period; in the New World amphidiploids and in *G. Thurberi* and *G. anomalum*, development proceeds as far as phase B; while in the Asiatic cultivated varieties, phases A and B are passed in the juvenile stage and development reaches phase C.

A short mathematical consideration is given to the connexion between leaf development (the progressive change in fully expanded leaf shape along the main axis) and leaf growth (the change in dimensions of an individual leaf).

In the final section of the paper, the phylogeny of the L alleles is discussed. The author suggests, following Goldschmidt, that two mutational levels must be recognized. Both in Asiatic and American diploids, alleles have become differentiated in respect of small quantitative changes in the degree of laciniation. These differences arose probably as micro-mutations in contrast to the telescoping of phase A and B in the Asiatic group and the reversal of dominance relations, a change regarded as a macro-mutation.

Only one series of L alleles is known in the American amphidiploids and it is concluded that the

phase B development of these species results from the combination of a stable allele common to all New World species (inducing phase A development) and various genes determining phase C development from the Asiatic parents.

An appendix reports that the *L* genes may act pleiotropically on other foliar organs such as bracts and sepals.

1087. GOVANDE, G. K. 633.51:581.48:575.242:575.11

A new gene for lintlessness in Asiatic cottons.

Curr. Sci. 1944 : 13 : 15-16.

A new lintless gene *li_a* has been discovered in Broach 9 cotton growing at Baroda. A similar mutant but of independent origin has also been found in Viramgam. Monomeric segregation for lintlessness is obtained by crossing mutant strains with linted varieties while crosses involving other lintless types show that the *li_a* is independent of other lintless genes but complementary to most of them.

1088. AHMAD, N. 633.51:581.6(54)

Technological Reports on trade varieties of Indian cottons, 1943.

Technol. Bull. Indian Cott. Comm. 1943 : Series A, No. 57 : Pp. 84.

AHMAD, N.

Technological Reports on standard Indian cottons, 1943.

Ibid 1943 : Series A, No. 58 : Pp. 103.

Detailed reports on laboratory tests of the quality of standard and trade varieties of Indian cotton are presented.

1089. IYENGAR, R. 633.51:581.6:519.271.3

Variation of fibre length in a bulk sample of cotton and in a single seed of the bulk.

Technol. Leaflet. Indian Cent. Cott. Comm. Technol. Lab. 1944 : No. 6 : Pp. 3.

Considerable differences in the coefficients of variation of the fibre length of individual seeds from a bulk sample have been discovered. These, however, do not result in the coefficient of variation of the whole sample being much greater than the individual figures.

1090. 633.51:581.6:575.12(54)

What the scientists are doing : Dholleras cotton improvement.

Indian Fmg 1943 : 4 : 468-69.

Two principal objectives are being sought by cotton breeders in the Dholleras cotton region. Firstly, attempts are being made to produce a strain superior to Wagad 8, and secondly, to find a substitute for the local Mathio cotton. Two new promising strains have been introduced to replace Wagad 8, viz. strain 4-1 (from Wagad 8 x 1027 ALF) x Wagad 8 and strain 7-1 (from Wagad 8 x 1027 ALF); both varieties are superior to Wagad 8 in yield and quality. Variety C520 has been introduced to replace Mathio cotton and further work is continuing in order to produce a still better cotton for the Mathio cotton areas.

1091. KNIGHT, R. L. 633.51-2.3-1.521.6:575.116.1

The genetics of blackarm resistance. IV. *Gossypium punctatum* (Sch. and Thon.) crosses.

J. Genet. 1944 : 46 : 1-27.

BAR 3, a strain of *G. punctatum* contains two linked genes for blackarm resistance, viz. *B₂* and *B₃*. *B₃* is a newly discovered semi-dominant gene conferring grade 7.1-8.1 resistance on Sakel when heterozygous, and grade 4.1-7.1 when homozygous. *B₂* and *B₃* are additive, the double dominant Sakel plants showing grade 3 resistance. *B₁*, from the American Upland strain Uganda B31, and *B₃* also combine to exert an additive effect.

The cross-over value of *B₂* and *B₃* is 32.4% but this value increased in some of the BAR 3 x Sakel back-cross progenies, perhaps through the interposition of a chromosome segment from the *G. barbadense* genome.

Gambia Native, another strain of *G. punctatum*, also possesses *B₂* and *B₃* together with additional minor resistance factors. Hindi Weed is heterogeneous for susceptibility, *B₂* being present in the resistant lines. Dafur Local is also heterogeneous for resistance, *B₃* and presumably *B₂* being concerned. The resistance of Kadugli Local has not yet been analysed.

1092.

633.51-2.483-1.521.6:575.12

633.51:581.6:575.242

Report of the Administrative Council of the Corporation submitted to the twenty-third Annual General Meeting on June 6th, 1944.

Emp. Cott. Gr. Corp. 1944 : Pp. 16.

This report includes references to the following genetical items. Anthracnose resistant lines have appeared in the progeny of the back-cross (Sea Island x U.4) x U.4. Studies on wild plants related to cultivated cottons have shown that the important difference between the two types is the reduction in the extent of cellulose deposition occurring in the cultivated varieties. It is believed that this reduction originated only once and that all cultivated varieties are descended from a single stock. A similar occurrence of true lint has been found in a related genus from Madagascar.

Recently a reverse mutation has been observed in Montserrat Island, the seed hairs of the mutant being fully thickened as in the wild species.

SUGAR PLANTS 633.6

1093. KHAN, M. A. and

RAHEJA, P. C.

633.61-2.111-1.521.6(54.2)

Frosts and sugarcane culture.

Indian Fmg 1943 : 4 : 465-67.

Varietal differences in resistance to frost injury are described.

1094. CHONA, B. L.

633.61-2.451.2-1.521.6

Sugarcane smut and its control.

Indian Fmg 1943 : 4 : 401-04.

A brief account of varietal susceptibility to smut is included in this article.

1095. PAL, H. N.

633.61.00.14(54.1)

Coimbatore canes in Assam.

Indian Fmg 1943 : 4 : 576-78.

Varietal tests of Coimbatore sugar canes in Assam are described.

STIMULANTS 633.7

1096.

633.71:581.6

Observation on "low nicotine" tobacco.

Lighter, Ottawa 1944 : 14 : No. 1 : 10-11.

The low nicotine content of a strain of Kentucky burley tobacco has been established by chemical and physiological tests.

1097.

633.71-2.411.4-1.521.6:575.127.2

New hope for healthy tobaccos.

Lighter, Ottawa 1943 : 13 : No. 3 : 4-5. (Mimeographed).

Brief mention is made of the possibilities of hybridizing commercial tobacco varieties with *Nicotiana Debneyi* in order to produce forms resistant to blue mould.

1098. RYAN, C. E. V.

633.72-1.557:575.42(54.8)

Some notes on the selection of high-yielders on Doombagastalawa Estate, Kotmale.

Tea Quart. 1943 : 16 : 45-51.

A method of field selection and yield estimation of tea bushes is described.

1099. BOND, T. E. T.

633.72-2.8-1.521.6

The 'phloem necrosis' virus disease of tea in Ceylon. I. Introductory accounts, symptoms, and transmission by grafting.

Ann. Appl. Biol. 1944 : 31 : 40-46.

A correlation between susceptibility of tea bushes to phloem necrosis and low "jât" [provenance] is reported. High "jât" types tend to act as carriers and some may possibly be immune.

1100. PRASAD, J.

633.79:581.6(54.3)

A short note on the beedi leaf industry.

Indian For. Leaf. 1943 : No. 60 : Pp. 12.

The variation in the quality of "beedi" leaves from *Diospyros melanoxylon* Roxb. may be determined genetically; superior grades come from the Central Provinces.

1101.

633.854.56:575(58.9)

Annual Report of Tung Experiment Station, Nyasaland.

1943 : Pp. 17.

Up to the end of 1942, 236 provisional selections of *Aleurities montana* had been made from a survey of approximately 9000 trees on thirteen estates. This year plantations totalling 6350 trees have been re-examined and a further 10,500 new trees have been surveyed, bringing the total number of trees now covered by the survey to rather more than 19,500, and the number of provisional selections to 354. A tendency towards biennial bearing makes it necessary to observe the selected trees over a number of years before drawing conclusions as to their merit. The highest yield so far recorded from any selected tree was given by No. M13 this season, viz. 84.2 lbs of dry seed. A fair number of trees have given yields of between 50 and 60 lbs of dry seed. The highest yield obtained from any *A. Fordii* selection was 16.2 lb.

Buddings began fruiting a year earlier than seedlings, but stronger growth was recorded in both unselected and selected seedlings than in budded trees. *A. montana* buddings on *A. montana* rootstocks had a greater girth than those on *A. Fordii* rootstocks.

In the 1943 flowering season artificial crossing between some of the clones propagated from the best mother trees was carried out at the station for purposes of raising a small number of legitimate seedling families derived from high yielding parents. It is hoped later to produce improved plant material by vegetative propagation of the best individual trees of these families.

Fruit setting was not limited by lack of pollen when only 5% of males was present. Monoclonal planting, however, is shown to be undesirable and it will be necessary to give careful consideration to the matter of pollination as soon as larger areas are established with pure stands of buddings, particularly if such plantations are opened up at a distance from other tung growing estates.

1102.

RAMANUJAM, S.

633.854.74:576.356.5:581.04:581.162.5:575.127.2

The cytogenetics of an amphidiploid *Sesamum orientale* x *S. prostratum*.

Curr. Sci. 1944 : 13 : 40-41.

An amphidiploid has been produced by treating the F_1 hybrid of *S. orientale* x *S. prostratum* with colchicine. The morphology of the new form is described and it is noted that pollen sterility is high even though meiosis is quite regular. It is proposed to regard the amphidiploid as a new species, *S. indicatum*.

MEDICINAL PLANTS 633.88

1103.

ROWSON, J. M.

633.88:576.356.5:581.6

Increased alkaloidal contents of induced polyploids of *Datura*.

Nature, Lond. 1944 : 154 : 81-82.

Tetraploid plants of *Datura Stramonium* L. and *D. tatula* L. have been obtained by colchicine treatment and contain a percentage alkaloid content approximately double that of the parent diploids. The relative proportions of hyoscyamine, atropine and hyoscine remained constant. Tetraploid plants of *Atropa* and *Hyoscyamus* have also been produced.

FRUITS 634

1104.

HARPER, R. S.

634.25:581.6:575.12(94.5)

Some new canning peach varieties.

J. Dep. Agric. Vict. 1944 : 42 : 181-86.

Thirteen peach hybrids developed at Palo Alto, California, have been introduced into Australia. Descriptions of the qualities of these forms are given.

1105.

KUMAR, L. S. S. and

SRINIVASAN, V. K.

634.651:576.132.35

Chromosome number of *Carica dodecaphylla* Vell Fl. Flum.

Curr. Sci. 1944 : 13 : p. 15.

A cytological study of *C. dodecaphylla* has shown that this species has 18 diploid chromosomes. The metaphase plates are similar to those found in *C. pubescens* and *C. Papaya* and no heteromorphic chromosome pairs are evident.

1106. CLARIDGE, J. H. and CALDER, R. A. 635.347:575.42(93.1)
Chou moellier and thousand-headed kale.
 N.Z. J. Agric. 1944 : 68 : 347-49.

The stocks of chou moellier and thousand-headed kale introduced into New Zealand have been improved by selection. Giant and a medium stemmed types of chou moellier have been developed, also a freely branching form of thousand-headed kale.

1107. AFIFY, A. 635.62:576.312.35:576.12
Cytological studies in the Cucurbitaceae and their evolutionary significance.
 J. Genet. 1944 : 46 : 116-23.

The cytology of several members of the Cucurbitaceae is described. *Cucumis Melo* L. has 24 diploid chromosomes, *C. sativus* L. 14, *Citrullus vulgaris* Schrad. 22 and *Cucurbita Pepo* L. 40 chromosomes. The evolutionary significance of these findings is discussed.

1108. FRENCH, M. H. 635.624:581.6(67.8)
Feeding values of different varieties of pumpkins for livestock.
 E. Afr. Agric. J. 1944 : 9 : 221-24.

Seven Tanganyikan pumpkin varieties are described and their biochemical composition given.

1109. REID, W. D. 635.652-2.3-1.521.6
 635.652-2.483-1.521.6
 635.652-2.8-1.521.6
The resistance of beans against bean-wilt and anthracnose and notes on occurrence of bean-mosaic.
 N.Z. J. Sci. Tech. 1943 : 25 : Sect. A. 125-28.

Forty-four varieties of beans have been tested for resistance to bean-wilt (*Pseudomonas medicaginis* Sack), anthracnose (*Colletotrichum lindemuthianum*) and bean-mosaic (*Phaseolus virus* 1 of Smith), thirty-four over a six-year period, and ten for one to two seasons. Of those beans tested for six years, two were free from bean-wilt, six from anthracnose, and ten from mosaic.

1110. CALDER, R. A. 635.656:575.12
A new garden pea : Greencrop (Greenfeast x Greatcrop).
 N.Z. J. Sci. Tech. 1943 : 25 : Sect. A. 165-69.

A new variety of garden pea developed by the Agronomy Division, Lincoln, New Zealand, from a cross between Greenfeast and Greatcrop is described. In plant characters it is similar to Greenfeast though slightly more robust and greener. The pods are carried mainly in pairs, are of a similar shape to Greenfeast but slightly smaller. The seed is wrinkled and green and slightly larger than Greenfeast. Greencrop matures a few days ahead of Greenfeast and is similar to that variety in cooking and canning qualities.

1111. LUTHRA, J. C., SATTAR, A. and BEDI, K. S. 635.657-2.421.9-1.521.6:575.12
Further studies on the control of gram blight.
 Indian Fmg 1943 : 4 : 413-16.

Attempts have been made to breed high yielding gram varieties resistant to blight (*Mycosphaerella rabiei*). The methods tried have included selection of the variety F8 and natural hybridization involving F8, F10 and P67. Strain 62-18, from F8 x P67 combines high yield with blight resistance.

Part II. Foreign.

STATISTICS 519

1112. BUZZATI-TRAVERSO, A. 519.24:575.11
La determinazione di frequenze geniche in una popolazione specifica. (**The determination of gene frequencies in a species population**).
Ricerca Scientifica 1942 : 13 : 448-58.

The author considers the calculations necessary for the determination of the value of the genetical frequencies in a natural population. The three types of frequencies determined are: (1) visible dominant or semi-dominant allelomorphs, (2) visible recessives and (3) recessive lethals. Though the experiments were done on *Drosophila* the author suggests that they may also be of value to plant breeders. R. M. I.

1113. COCHRAN, W. G. 519.24:631.421
Some additional lattice square designs.
Res. Bull. Ia Agric. Exp. Sta. 1943 : No. 318 : 731-48.

Some lattice square designs are described which differ from the "balanced" lattice squares of Yates in that they necessitate fewer replications.

1114. COCHRAN, W. G. 519.24:631.421
Some developments in statistics.
Chronica Botanica 1943 : 7 : 383-86.

Recent developments of statistical methods for field trials and the analysis of experimental data are reviewed.

1115. BORDEN, R. 519.24:631.421:633.61
Yield variations with special reference to border effects in field tests.
Hawaii. Plant. Rec. 1943 : 47 : 195-203.

An investigation into the border effect in sugar cane field trials for manurial response has shown that the effect may or may not be of importance. It is advisable therefore to allow for its possible significance in designing lay-outs.

PHYSICS 53

1116. ZALKIND, S. JA. 535.61-31:576.353
(**The present state of the question concerning the inhibitors of mitogenetic radiation**).
Uspehi Sovremmenoi Biologii (Advances in Modern Biology) 1943 : 16 : 415-25.

This review deals with the results (up to 1941) of Russian investigations on the subject to which the author himself has made some contributions. There are two kinds of agents that exert an inhibiting effect upon mitogenetic radiation. Arsenic, potassium iodide, quinine, acetone, bile, and the substances that are found in blood in cases of depressive insanity and in pus from suppuration belong to the first group (A); recently similar inhibitors were reproduced experimentally in the serum of normal blood treated with histamine. Those inhibitors that occur in the blood of carcinomatous subjects belong to the second group (B). The groups A and B differ considerably in their physico-chemical properties. The A substances are not inactivated by boiling during several minutes, and are impermeable to mitogenetic radiation irrespective of its source of origin. The B substances, with which the author mainly deals in this paper, are thermolabile, being colloidal, enzyme-like, negatively-charged bodies which can be adsorbed on kaolin and which do not absorb the already existing mitogenetic radiation but interfere with the processes causing it. As a result of biochemical studies and model experiments, it is now generally accepted that the inhibiting effect of the B substances is due to their adsorption of free radicals in solution, thus preventing the recombination of radicals which is the ultimate cause of mitogenetic radiation. The B inhibitor is the specific product of carcinomatous cellular growth and does not occur elsewhere in nature. In contrast with a true enzyme, the B inhibitor is used up in the course of a reaction set up in the substrate in which it is present. The B inhibitor has been isolated in varying degrees of purity and concentration, and its hydrolytic product, which is used in the overwhelming majority of modern experiments, has also been successfully isolated. The latter is characterized by the absence of electrical charge, by the ease with which it penetrates into the body of a cell, and by its thermostability. Comprehensive experiments with fluid cultures of yeast and on rodents showed that the B inhibitor exercises a

temporary and not a permanent inhibitory effect on mitogenetic radiation; the latter is restored in 30–34 minutes after the addition of the B inhibitor. It has been proved by experiment with corneal epithelium that a simultaneous addition of A and B inhibitors causes a complete cessation of mitosis.

H. F.

BIOLOGICAL SCIENCES 57

1117. *BAIKOV, A. A. 57.00.15(47)
(The Academy of Sciences of the U.S.S.R. during the last 25 years).
Jubilee Session of the Academy of Sciences of the U.S.S.R. Moscow-Leningrad
1943 : 28–53.

*ORBELI, L. A.
(Development of biological sciences in the U.S.S.R. during the last 25 years).

Ibid. 1943 : 216–27.

These reports review the progress made in the development of science in the U.S.S.R. since the October revolution. The present organization of biological research is described and its theoretical dependence on Darwinism emphasized.

BREEDING 575

1118. 575:633(43)
Tätigkeitsbericht der Kaiser Wilhelm-Gesellschaft zur Förderung der Wissenschaften für das Geschäftsjahr 1940/41. (Report of the activities of the Kaiser Wilhelm Society for the Promotion of Science for the working year 1940–41).
Naturwissenschaften 1941 : 29 : 425–33.

Institute of Fibre Research

Flax breeding and hybridization have been carried out, together with tests on spinning quality and fibre content.

Institute of Biology

The following subjects have been studied: the adaptability of polyploids to extreme environmental conditions, the selection value and breeding uses of polyploids, the artificial induction of polyploidy, the metabolism of polyploids, the question of species formation with special reference to alpine plants, cytological research ancillary to these problems, the dependence of the mutation rate on nutritive factors and on chemical influences, and the significance of mutation in specific differentiation.

Institute for Breeding Research

Progress in hemp breeding is reported.

Genetical Section

The effect of ultra-violet light and X-irradiation on the mutation rate has been studied, also population genetics.

1119. 575:633(47)
575.3:575.12(47)

(Six years' work of the State Breeding Stations).

Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) Moscow 1943 : No. 8 : 42–50.

The great success of the state breeding stations in recent years is ascribed to the fact that the principle of T. D. Lysenko has been applied; this principle consists of applying continuous selection to the material used for seed production, as opposed to merely maintaining purity as had been the previous practice, and of providing the best possible cultural conditions for the seed plots, a matter to which the old pure line theory had engendered complete indifference. The scheme of seed production now employed is outlined. The basic material is provided by intra-racial crossing in the case of self-fertilized plants and by crossing forms grown under different conditions or in different places in the case of out-pollinated plants. Supplementary artificial pollination is also practised in the latter group, by which means yield increases of 25–30% have been obtained.

* Extended summaries of these papers are on file at the Bureau.

The elite seed produced by these methods has given 10–15% more yield than seed raised by the ordinary method of mass reproduction. By combining selection with the ordinary process of seed production a number of improved new varieties of various crop plants have been produced. These include the winter wheat Vorošilovskaja U.K., resistant to yellow rust, and a selection of the winter wheat Pervenec with improved baking quality.

A study of local forms of crop plants has shown that forms from two different localities, though morphologically indistinguishable, may behave quite differently when transferred to a third locality, and are evidently different physiologically.

In spite of the thousands of crosses that have been made in the last 12–15 years very few successful new crop plant varieties have been produced. This is largely ascribed to the neglect of the principle of selective fertilization in making the crosses. A number of new hybrids recently produced by this latter method have proved far superior to those produced by the old method of artificial hybridization. Still further improvements have been effected by applying supplementary artificial pollination both to cross-fertilized and self-fertilized plants; no segregation in morphological characters has been observed in the second or third generations of rye pollinated even by a variety of very different morphological type. The same was true with most wheat varieties. The winter-hardiness of the varieties was materially increased by this procedure, even when the pollinating variety was a less hardy form.

1120.

TORPE, N. V.

575:633(48.5)

633.00.14(48.5)

Kort redogörelse för Värmlandsfilialens verksamhet och arbetsuppgifter. Föredrag vid Sveriges Utsädesförenings årsmöte i Karlstad den 27 juli 1943. (Short report on the work and future tasks of the Värmland Branch Station—Report at the meeting of the Swedish Seed Association in Karlstad, 27 July 1943).

Sverig. Utsädesfören. Tidskr. 1943 : 53 : 405–11.

Information is included on tests of varieties of cereal and other crops in the Värmland area:—

Wheat

Pärl (Pearl) wheat and another autumn wheat Vrm 01134 (0912 x 0826) which has run it very close represent a further advance in wheat improvement. Several new varieties have stood the recent severe winters very well but must undergo further testing. Some promising lines from U 01250b₂ and Jarl x Svea II have reached the stage of comparative trials.

In a collection of about 20 spring land wheats, one from Östervallskog has done well and in 1942 surpassed Diamant II in yield.

Rye

Extensive trials were conducted. Kungs II (King's II) did very well as far north as central Fryksdal, Arvika and Charlottenberg. Above that limit a series of Värmland strains, Vrm 35/16, Stål (Steel) x Wasa, 39/43 Stål x Härmä, 39/30 Stål x Svedje, 40/43 Sangaste x Toiva gave interesting results, even surpassing the standard by 50–70% at times. No. 40/33 is extremely hardy and in 1941 at Varpnäs did 88% better than Petkus, which gave an average yield of 2200 kg./ha. The straw of No. 40/33 may, however, be a little too long and further trials are needed. It has been crossed with Kungs II to get a shorter, stiffer straw combined with equal hardiness. In trials in 1940 at Malung, which has a rather severe climate, Vrm 39/43 Stål x Härmä gave 3130 kg. per ha. as compared with 1030 kg. per ha. from Malm.

Oats

About 100 varieties were tested during the year, including Guldregn II (Golden Rain II), Seger (Victory), Stjärn (Star), and the new Sol II from the Västgöta Branch Station. Trials from 1918–40 have already been recorded.

For the central and more northerly parts of the region earlier white oats with better yields are needed and Vrm 01466 seems promising. It was obtained from a Svalöf cross between Seger and Gopher in 1926 and is thus a sister variety of the variety Primus now on the market. No. 01466 excelled Odal, Bambu and Primus at Varpnäs, equalled Guldregn II at Lakenetorp in 1938–42 and gave the best yield in trials at Malung 1939–42; at Svalöf in 1942 it even surpassed Seger by 3.6%.

Barley

At the Värmland Station line selection from about 40 old land varieties of 6-rowed barley has resulted in three varieties superior in yield to Stella and Vega judged on the 1935–42 average; they are remarkable for their high crude protein content, e.g. 16–18% for the strain Vrm 32/123 when cultivated on peat bog soil.

Peas

The culinary pea, Torsdags II, has proved very suitable for the district, while a particularly good fodder pea for the region is Malmärt, a derivative of Rättviksärt (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 644). It is a small seeded and therefore easily dried type, with a 1000-seed weight of 80-95 grm.

The Station is carrying out crosses between Malm on the one hand and Artturi, Hero, Solo and Gröpart on the other.

Potatoes

The Stensgård potato though closely resembling Up-to-date has out-yielded it in the Värmland Station trials. The Stensgård potato was discovered in 1920 in a planting of the white flowered so-called Sendsta potato from Norway from which it, however, differed in its more vigorous growth and light reddish-purple flowers.

Root crops

This work has already been recorded (cf. "Plant Breeding Abstracts", Vol. XIV, Abst.229).

Herbage plants

Recommended local clover strains that have been tested for a long time are listed. Selection work is in progress within the best Värmland strains and a survey of clover strains in Dalarna is contemplated.

Work on timothy gave results very soon and Bore timothy, described by Georg Nilsson, was put on the market in 1929. Vrm 0842 (Bore II), a further advance, has not yet been placed on the market. A local strain from Varpnäs, which has done well in experiments, is undergoing selection.

1121. 575:633(56)
*GÖKÇÖL, M. 633-1.531.12-1.521.5(56)

Yurdumuzda tohum islâhciliğinin esas gayeleri ve bunun inkisaf yollari.
(The principal aims of seed improvement and its ways of development
in our country).

Zıraat Dergisi 1943 : 4 : No. 39 : 10-13.

The production of high quality seed for Turkish farmers and the promotion of plant improvement are important economic problems for the Ministry of Agriculture in Turkey. Since 1925 experiment stations have been established at various places for the production of improved seed of cereals, hemp, clover, fruits, vines, nuts, olives and tea, and in a short time considerable progress has been made, though this work must still be extended and developed to meet the particular requirements of various districts and the demand for improved seed in all parts of the country.

High yielding varieties resistant to drought, cold and diseases are required and the choice of the actual variety will also become more important as the productivity of the soil is improved by irrigation and other means.

Among the sub-tropical crops, tea only has been investigated, but the possibility of cultivating guayule, *Eucommia* and other rubber plants, also quinine and coffee, should be explored. Research should also be promoted on citrus fruits, bananas and pepper, etc., and on the cultivation of vegetables and fruit trees on high cold plateaux.

The improvement of quality also demands special attention, as is evident from the great importance of such characteristics as the cooking qualities of beans or the baking quality of flours.

1122. HEINICKE, A. 575:633(74.7)
Sixty-second Annual Report of the New York State Agricultural
Experiment Station for the year ended June 30, 1943 (1944): Pp. 75.

Peach

Hybridization for winter hardiness is in progress.

Grapes

Efforts are being made to combine seedlessness with resistance to cold. Varieties derived from American native species tend to be more winter hardy than those of pure European ancestry.

1123. BAYLES, B. B. 575:633(79.7)
Improved grains bring higher yields.

Agric. Situat. 1944 : 28 : No. 3 : 13-15.

Progress in the breeding of American varieties of maize, wheat, oats, barley, flax, rye and sorghum is briefly reviewed.

1124. BLOHM. 575:633:007(43)
 Professor Roemer 60 Jahre. Forscher und Lehrer im Dienste der Landwirtschaft. (**Prof. Roemer's 60th birthday. Research worker and teacher in the service of agriculture**).
 Forschungsdienst 1943 : 16 : 209-10.

An appreciation of the author's extensive contributions to plant breeding and genetics is presented.

GENETICS 575.1

1125. SAX, K. 575.1(47)
Soviet biology.
 Science 1944 : 99 : 298-99.

Recent trends in Russian genetical theory are criticized, in particular the anti-Mendelian tenets of Lysenko and his followers, on the grounds that these authors appear to uphold a Lamarckian theory on the nature of heritable variation. This is believed to be due in part to the subservience of Russian science to the official political philosophy.

1126. PENNELL, F. W. 575.1:001.4
Concerning "genotypes".
 Science 1944 : 99 : 320-21.

The word "genotype" is used in two senses, firstly by taxonomists, to mean the type species of a genus, and secondly, by geneticists, to mean the combination of genes in an organism. It is suggested that the second usage should be preferred on etymological grounds and that the term "generitype" should be used for the taxonomic concept.

1127. MACARTHUR, J. W. 575.1-181
Genetics of body size and related characters. I. Selecting small and large races of the laboratory mouse.
 Amer. Nat. 1944 : 78 : 142-57.

Zoological evidence is presented in favour of the geometrical theory of size gene interaction. In opposition to the theory developed by Mather, the author contends that "size genes or modifiers multiply each other's effects (that is, act geometrically), and do not simply add to or subtract from the body weight some definite and constant number of grams".

1128. SPRAGUE, G. F. 575.125
The problem of heterosis.
 Chronica Botanica 1943 : 7 : 418-19.

The various theories proposed to explain hybrid vigour are reviewed. The theory of interaction of dominant growth factors and the theory of physiological stimulation are not mutually exclusive when the latter explanation is put on a genetical basis. Heterosis is manifested at various stages of the life cycle according to the plant used; the proximate cause of increased vigour appears to be an increase in the number of cells, not a larger cell size.

1129. POWERS, L. 575.125:575.115:635.64
An expansion of Jones's theory for the explanation of heterosis.
 Amer. Nat. 1944 : 78 : 275-80.

This paper develops the theory that "heterosis and dominance are different degrees of expression of the same physiological genetic phenomena". Data are presented from tomato hybridization experiments to demonstrate that both conditions are controlled by the interaction of environmental and genetical factors, the latter being the resultant of a complex of interacting genes.

1130. BLAKESLEE, A. F. and SATINA, S. 575.127.2:578.08
New hybrids from incompatible crosses in *Datura* through culture of excised embryos on malt media.
 Science 1944 : 99 : 331-34.

The following causes of unsuccessful interspecific hybridization are listed: (a) sterility genes, (b) failure of pollen germination, (c) bursting of pollen tubes before fertilization, (d) wilting of styles before the pollen tubes reach the ovaries, (e) failure to effect fertilization, (f) early abortion of the zygotes, and (g) arrested development of the embryos. Methods of countering these obstacles are discussed, in particular the method of embryo culture after dissection from the young seed. The "embryo factor" found in coconut milk is also present in malt media if the latter are sterilized by filtration instead of heat. Several successful interspecific hybrids of *Datura* species are described.

1131. SONNEBORN, T. M. 575.182

A new system of determination and inheritance of characters.

Rec. Genet. Soc. America 1943 : No. 12 : 53-54. (Abst.).

The mode of inheritance of the killer character in *Paramecium aurelia* is described. Both genic and cytoplasmic factors appear to be involved (cf. "Plant Breeding Abstracts", Vol. XIV, Absts 780 and 781).

1132. MOL, W. E. DE. 575.24:575.17:537.531

Na het veertiende jaar roentgenbestraling van tulpen en hyacinten ter opwekking van somatische mutaties. (**Fourteen years of X-ray irradiation of tulips and hyacinths to induce somatic mutations**).

Genetica 1943 : 23 : 329-52.

The literature of the genetic hypothesis of the inhibition, retardation and acceleration of division as a result of X-ray mutations is discussed. The results of the writer's X-ray irradiation of tulips and hyacinths during 13 years are described in detail. In opposition to other investigators, the writer believes that the same type of inhibitory, retarding or accelerating X-ray reactions as the effects produced on the division of the microscopically visible cells, nuclei, chromosomes and chromosome fragments, e.g. in meiosis of tulips, also occurs in division of the invisible genes. In his opinion, the "direct hit" hypothesis is not in accordance with the facts and the work of Dubovsky and Demerec is cited in support of the view that allowance must be made for the operation of biological factors affecting the rhythm of division of the elementary genes.

1133. PÄTAU, K. and
TIMOFÉEFF-RESSOVSKY, N. W. 575.24:581.036:519.24:578.08

Statistische Prüfung des Unterschiedes der Temperaturkoeffizienten hoher und normaler Mutationsraten nebst einem Beispiel für die Planung von Temperaturversuchen. (**Statistical testing of the difference in the temperature coefficients of high and normal mutation rates together with an example for the planning of temperature experiments**).

Z. indukt. Abstamm. -u. VererbLehre. 1943 : 81 : 62-71.

This paper presents a statistical analysis of the degree of significance established in researches on the temperature coefficient of *Drosophila* mutation rates. A suggestion for an improved statistical technique is contained in the example quoted.

1134. BRÜCHER, H. 575.242:575.41:581.02:575.125

Vitalitätssteigerung bei Mutanten in künstlichem Klima. (**Increasing the vitality of mutants in artificial climate**).

Naturwissenschaften 1941 : 29 : 422-23.

By growing mutant forms of *Antirrhinum majus* under artificially regulated conditions of humidity, temperature and illumination, it was shown that in certain environments the mutants grow better than the wild type and presumably have a higher selection value. A heterozygous mutant developed better than the homozygous specimens.

1135. ZAMENHOF, S. 575.246:581.04

Studies on factors influencing mutability.

Rec. Genet. Soc. America 1943 : No. 12 : 57-58. (Abst.).

A decrease in the mutation rate of an unstable *Drosophila* gene has been effected by adding copper sulphate, sodium hydroxide or ammonium hydroxide to the food.

1136. ANDERSSON, E. and
TEDIN, O. 575.42:519.24

The effect upon the mean and variability of the dependent variate of a selection according to the independent.

Hereditas, Lund 1944 : 30 : 249-53. (Abst.).

In problems of selection involving two variates it is often of importance to know the mean and variance of one variate for selected values of the other. The authors derive expressions for the mean and variance of y when those values of x are selected which are greater than x_1 . It is assumed that the complete bivariate frequency distribution of x and y can be expanded in terms of derivatives of the separate normal frequency functions in x and y and that semi-invariants above the fourth order can be neglected. The latter assumption is decidedly questionable.

J. O. I.

1137. BURGEFF, H. 576.12:575.24
 Konstruktive Mutationen bei *Marchantia*. Vererbungsversuche zur Frage der Evolution der Lebermoose. (**Constructive mutations in *Marchantia*. Inheritance studies on the question of the evolution of the liverworts.**)
 Naturwissenschaften 1941 : 29 : 289-99.

An analysis of the behaviour of interspecific crosses in *Marchantia* and the development and genetics of the mutants, has thrown light on the nature of evolution within the group. Many of the mutants exemplify the evolutionary reduction trends previously postulated for the Marchantiales on morphological grounds by Goebel.

Interspecific differentiation is usually dependent on the combined effects of numerous genes, each exerting only a small effect. Generic differences, on the other hand, are probably monogenic and arise by single large mutations. It is admitted that these two categories of biological differentiation are not distinct absolutely but the probable origin of genera and families by single leaps is emphasized.

1138. ILJINSKII, A. P. 576.16:575.41
 576.356.5:576.16
 (**Ecotypes, polyploids and natural selection.**)
 Priroda (Nature) 1943 : No. 1 : 63-67.

The author discusses the results of Hiesey, Clausen and Keck (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 753) and Stebbins (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 768) in the light of his own researches. It is pointed out that in nature there occur two mutually opposed processes side by side. The first consists of the selection of highly adapted local races in particular areas, i.e. the differentiation of the species. However, the climatic conditions vary from year to year and temporary migration of one ecotype into the zone of another may occur. This often leads to inter-crossing, with the production of a heterotic F₁ better adapted than the parents and of new types with new potentialities in the later generations. The importance of polyploidy in producing races capable of colonizing new areas is illustrated by reference to the work of Stebbins on *Eriogonum*. Finally, the positive creative action of these processes, in contrast to Turesson's concept of the formation of ecotypes by the mere sifting out of existing forms, is stressed and shown to be in conformity with the Darwinian viewpoint.

1139. HÄMMERLING, J. 576.16:576.312:581.04
 Entwicklung und Regeneration von *Acetabularia crenulata*. (**Development and regeneration in *A. crenulata*.**)
 Z. indukt. Abstamm. -u. VererbLehre 1943 : 81 : 84-113.
 HÄMMERLING, J.
 Ein- und zweikernige Transplantate zwischen *Acetabularia mediterranea* und *A. crenulata*. (**Uninucleate and binucleate transplants between *A. mediterranea* and *A. crenulata*.**)
 Ibid. 1943 : 81 : 114-80.

Regeneration of nucleate and enucleate portions of *Acetabularia* species has been studied. Morphological differentiation has been found to depend on the elaboration of specific substances by the nuclei. These substances are peculiar to the species and the differences between them are, at least partly, qualitative. No evidences of plasmatic differences or of reaction between the specific substances in the grafts were obtained. Enucleate fragments can differentiate by the mobilization of specific substances stored within the protoplast.

CYTOLOGY 576.3

1140. SCOTT, F. M. 576.312.32
 Cytology and microchemistry of nuclei in developing seed of *Echinocystis macrocarpa*.
 Bot. Gaz. 1944: 105 : 329-38.

The morphology and microbiochemistry is described of the large nuclei in young seeds of *E. macrocarpa*. Chromatin threads in the resting stages could sometimes be resolved into 3-5 component strands. The distribution of amino-acids and sugars is described, also the effects of trypsin digestion which can be inhibited by the addition of lanthanum chloride.

1141. LEVAN, A. 576.312.34:575.127.5
 On the chromosomes of a new *Mahonia-Berberis* hybrid.
 Hereditas, Lund 1944 : 30 : 401-04.

Persistence of the size difference between the chromosomes of *M. Aquifolium* and *B. Sargentiana* has been observed in the F₁ intergeneric hybrid.

1142. STEIN, E. 576.35:575.243:576.356.5:539.16
Cytologische Untersuchungen an *Antirrhinum majus* mut. *cancroidea*.
Endomitosen-Entwicklung. (Cytological investigations on *A. majus*
mut. *cancroidea*. Endomitotic development).
Chromosoma 1942 : 2 : 308-33.

A critical discussion of the views that have been held by the author and other investigators of endomitosis in plant and animal cells forms the preface to the study here described of the recessive Mendelian *cancroidea* mutants obtained by radium irradiation of *A. majus*.

In addition to irregularities in division with resulting polyploidy, differences in the size and shape of the chromosomes were observed accompanied by complete or incomplete endomitosis. Polyploidy may result from endomitosis in several ways. The chromosome growth leading to endomitosis observed in the *cancroidea* plants is presumably dependent to a great extent on the conditions of light and heat.

The bearing of the findings of various investigators of the subject upon the problem of the paired chromosomes found in tumour cells in man and other animals and plants is discussed with observations on the time relationship between endomitosis and mitosis in different organisms. An extensive bibliography is appended.

1143. SPENCER, W. R. 576.35:578.08
Crossingover in spaghetti chromosomes.
J. Hered. 1944 : 35 : 8-10.

A laboratory model made from spaghetti is described for the teaching of elementary cytology.

1144. SPARROW, A. H. 576.354.4:537.531
X-ray sensitivity of meiotic and microspore chromosomes of *Trillium*.
Rec. Genet. Soc. America 1943 : No. 12 : 54-55. (Abst.).

X-ray experiments with *T. erectum* have demonstrated that sensitivity (measured by fragmentation efficiency) is least in early meiotic prophase and increases until anaphase I. It is suggested that this sequence is correlated with the nucleic acid and spiralization cycles.

1145. OEHLKERS, F. 576.354.4:581.04
575.243:581.04
Die Auslösung von Chromosomenmutationen in der Meiosis durch Einwirkung
von Chemikalien. (The induction of chromosome mutations at meiosis
by the action of chemicals).
Z. indukt. Abstamm.-u. VererbLehre 1943 : 81 : 313-41.

Cut inflorescences of *Oenothera (suaveolens sulfurea x Hookeri) flavens^h Hookeri*, *Lilium candidum* and *Campanula persicifolia* were placed in aqueous solutions of a variety of organic and inorganic chemicals at varying strengths, singly and in combination. The induction of "mutations" was estimated by studying the configurations produced at metaphase I of meiosis. In all three plants it was found that mutations were induced and that their frequency was very high with certain combinations of chemicals.

The substances used were potassium chloride, nitrate, rhodanide, and citrate, calcium chloride, nitrate, rhodanide and citrate, sodium chloride, nitrate, rhodanide and citrate, aluminium chloride, nitrate and citrate, ammonium chloride and citrate, ethylurethane, propylurethane, grape sugar and saponin. The highest percentage of translocations (16%) was produced by combinations of potassium chloride and ethylurethane. J. L. F.

1146. COOPER, K. W. 576.354.46
Invalidation of the cytological evidence for reciprocal chiasmata in the
sex chromosome bivalent of male *Drosophila*.
Proc. Nat. Acad. Sci. Wash. 1944 : 30 : 50-54.

Evidence is brought forward to disprove the contention of Darlington that chiasmata occur in the sex chromosome bivalent of *Drosophila*. The postulation of chiasmata is held to be redundant and can be replaced by the simpler notion of chromosomal conjunction. It is concluded that "the entire problem of bivalent formation and modes of conjunction requires re-analysis, for the chiasma hypothesis of metaphase pairing is clearly incapable of generalizing all of the facts".

1147. ÖSTERGREN, G. 576.356:581.04
An efficient chemical for the induction of sticky chromosomes.
 Hereditas, Lund 1944 : 30 : 213-16.

Ethylene glycol induces chromosome stickiness when applied in a solution of .5 mol. or higher concentration. C-mitosis appears also in the more concentrated solutions but toxic effects are only slight.

1148. GILES, N. H. (jun.) and HUMPHREYS, R. F. 576.356.2:539.185.9
Comparative effects of X-rays and neutrons in inducing chromosomal rearrangements and mutations, primarily in *Tradescantia*; measurement of neutron dosages and intensity of neutron radiation.
 Yearb. Amer. Philos. Soc. 1942 (1943) : 152-53.

A linear relationship has been demonstrated between neutron dose and the frequencies of induced chromatid and chromosome aberrations. There is no intensity effect for two-hit types of aberration but recoil protons of lower maximum energies have been found more efficient in producing effects. This finding lends support to the theory that more than one ionization is required to produce a chromosome break.

1149. STRAUB, J. 576.356.2:575.123
 Untersuchungen über die zytologische Grundlage der Komplexheterozygotie.
(Investigations on the cytological basis of complex heterozygosis).
 Chromosoma 1941 : 2 : 64-76.

In *Rhoeo discolor*, which forms a ring of all its 12 chromosomes at diakinesis, it was found that only end segments of the chromosomes paired at pachytene. The pairing segments comprise about one-third of the total length of the chromosomes and lie close together in the pachytene nucleus.

By counting the frequency of anaphase bridges in a form with a small terminal inversion, it was estimated that the inverted segment was involved in a chiasma in 35.8% of the cells. It is concluded that the chromosomes of *Rhoeo* consist of three types of segments: (i) the terminal pairing segments, (ii) the differential segments on either side of the centromere and (iii) a transition zone between the first and second zones.

Since the chromosomes of *Rhoeo* are mainly euchromatin, it is concluded that markedly heterochromatic sectors are not essential for the origin of complex heterozygotes with large rings of chromosomes.

J. L. F.

1150. POHLENDT, G. 576.356.2:575.242.061
 Cytologische Untersuchungen an Mutanten von *Antirrhinum majus* L. II.
 Mosaikpflanzen mit reziproken Translokationen. **(Cytological investigations on mutants of *A. majus* L. II. Mosaic plants with reciprocal translocations).**
 Chromosoma 1942 : 2 : 387-406.

The material investigated comprised F_1 plants heterozygous in one case at the loci *uni*, *dich*, *Div*, *serp* and in the other *uni*, *comp*, *pal*, *Div*. All these loci belong to the second chromosome. Phenotypically the F_1 plants were a mosaic of the "normal" and "variant" characters concerned. In the course of their development the variant characters were suppressed and the normal characters became more prominent.

J. L. F.

1151. LÖVE, A. 576.356.5:576.312.332
Cytogenetic studies on *Rumex* subgenus *Acetosella*.
 Hereditas, Lund 1944 : 30 : 1-136.

Several points of general theoretical interest emerge from this paper. The subgenus *Acetosella* contains a dioecious polyploid series of four members which the author considers are worthy of specific status. It is insisted, however, that the autopolyploid groups have probably arisen polyphyletically. Sex determination follows the *Melandrium* patterns; there is a sex-linked heteromorphic chromosome pair in the diploid species with the male-determining elements localized in the Y chromosome. In the polyploids, there are 3, 5 or 7 X chromosomes in the male plants and only one Y chromosome, but this is strongly epistatic to all the X factors. A distinct tendency has been noticed for the extra X chromosomes in the higher polyploids to revert to the autosomal condition.

1152. PIRSCHLE, K. 576.356.5:581.02
Resistenzversuche mit polyploiden Pflanzen. (**Experiments on resistance with polyploid plants**).
Naturwissenschaften 1941 : 29 : 338-39.

Diploid and tetraploid plants of *Stellaria media* have been grown in nutrient solutions of different concentrations and under various conditions of temperature and photoperiod. In most cases the diploids exceeded the tetraploids in height, fresh weight and dry matter content.

1153. ÖSTERGREN, G. 576.356.5:581.04:576.312.381
Colchicine mitosis, chromosome contraction, narcosis and protein chain folding.
Hereditas, Lund 1944 : 30 : 429-67.

An investigation into the c-mitotic properties of about 50 organic compounds has been made and it is concluded that chromosome contraction, c-tumour formation, c-mitosis and poisoning are four independent but closely related reactions whose threshold values, in respect of the concentration of the reagent, are most usually arranged in the order quoted. In many cases, however, exceptions are found and the threshold values are differently disposed. The pre-eminent position of colchicine as an agent for inducing polyploidy is due to the especially large difference in the threshold values of the c-mitotic and toxic reactions.

For all these effects, a correlation has been established between activity and lipophilic properties. Inactive substances are usually either very hydrophilic or extremely insoluble in water. When a series of organic compounds of decreasing solubility is studied, it is found that the effects with the higher threshold values tend to disappear, toxicity going first and chromosome contraction persisting longest.

An explanation for these facts is sought in the theory of narcosis. C-mitosis is regarded as a narcosis of cell-division and c-tumour formation of cell growth. A new theory of narcosis is also proposed, the primary effect being ascribed to the contraction of protein micelles by chain folding. This is held to occur in various ways, e.g. through the attraction between c-mitotic substances and the lipophilic residues in the protein side chains, by electrovalent attractions, and by physical agents such as cold. In the case of c-mitosis, the spindle is regarded as a liquid crystal of fibrillar proteins which is dissolved by the contraction induced in the micelles. Induced chromosomal contraction is explained similarly.

1154. FAGERLIND, F. 576.356.5:581.143.26:581.163
Der Zusammenhang zwischen Perennität, Apomixis und Polyloidie. (**The relation between perennial habit, apomixis and polyloidy**).
Hereditas, Lund 1944 : 30 : 179-200.

Evidence is presented to show that both perennial habit and apomixis are correlated with polyploidy. The reasons for these relationships are discussed and although there are grounds for believing with Stebbins that apomixis may result from the interplay of complementary genes within a polyploid nuclear environment, it is concluded that, in general, the reverse causal relation has been operative. That is to say, perennial habit and apomixis tend to conserve any nuclear change such as polyploidy, since the period of vegetative development is more prolonged than in the amphimictic annual type.

1155. GRAFL, I. 576.356.5:581.331.1
Über das Wachstum der Antipodenkerne von *Caltha palustris*. (**On the growth of the antipodal nuclei of *Caltha palustris***).
Chromosoma 1941 : 2 : 1-11.

Before the fusion of the polar nuclei the antipodal cells undergo nuclear division and become binucleate. The two nuclei of a cell undergo almost simultaneous mitosis and by fusion of the two spindles two nuclei are produced with a double number of chromosomes. This process may be repeated three times, leading to the development of octoploid nuclei, though in the later stages irregularities occur. The analogy with the behaviour of tapetal cells is indicated. J. L. F.

MICROSCOPIC TECHNIQUE 578.6

1156. METCALF, R. L. and PATTON, R. L. 578.6
Fluorescence microscopy applied to entomology and allied fields.
Stain Tech. 1944 : 19 : 11-27.

The technique and usefulness of fluorescence microscopy is described and a list of fluorochromes appended.

1157. RICHARDS, O. W.,
SMALL, J. H. and
COLLYER, P. W. 578.6
Microscopy with plastic substitutes for cover glasses.
Stain Tech. 1944 : 19 : 59-62.

The optical properties of plastic cover glasses have been determined and found satisfactory when the material is optically homogeneous and of uniform thickness.

1158. DARROW, M. A. 578.65
Anilin blue as a counterstain in cytology.
Stain Tech. 1944 : 19 : 65-66.

A quick staining technique is described for plant material, involving fixation in CRAF fluid, staining in safranin and counterstaining in aniline blue W.S.

BOTANY 58

1159. ALMEIDA, A. O. DE,
GOULART, M. D.,
IELPO, M. and
PINTO, A. V. 581.142:577.17
Estudo da ação inibidora do suco de "*Solanum lycopersicum*" sobre a germinação de sementes e crescimento de plantas. (Study of the inhibiting action of the juice of *S. lycopersicum* on seed germination and plant growth).
Rev. Brasil. Biol. 1941 : 1 : 345-54.

The juice of fruits of tomato, cucumber and papaya inhibited germination when applied to seeds of tomato and several other cultivated plants.

1160. GUSTAFSSON, A. 581.163:001.4
The terminology of the apomictic phenomena.
Hereditas, Lund 1944 : 30 : 145-51.

The terminology introduced by Fagerlind to describe apomictic development is criticized. According to Fagerlind, agamogony is a special case of agamospermy and is characterized by the reproduction of the sporophyte taking place through the formation of an unreduced gametophyte. This definition, however, yields in priority to that of Hartmann, who applies the term to reproduction by means of cells undifferentiated in respect of sex. Similarly, Fagerlind's definition of diplospory, as the mode of gametophyte formation in which the first division of the mother-cell is pronouncedly meiotic in character, should be rejected in favour of Edman's earlier use of the term for the process of unreduced gametophyte formation from archesporial tissue.

1161. CHRISTOFF, M. and
PAPASOVA, G. 581.163:575.12
Die genetischen Grundlagen der apomiktischen Fortpflanzung in der Gattung *Potentilla*. (The genetical basis of apomictic propagation in the genus *Potentilla*).
Z. indukt. Abstamm. -u. VererbLehre. 1943 : 81 : 1-27.

An extensive series of hybridizations within the genus *Potentilla* have been made and the inheritance of apomixis investigated. When amphimictic strains are pollinated by apomicts, the progeny are usually mixed, apomicts, amphimicts and amphiapomicts being produced. The reciprocal cross, in which apomicts are used as the female parents, reproduces matroclinously. Amphiapomicts, which normally reproduce both sexually and apomictically, give rise to a mixed progeny of apomicts, amphimicts and amphiapomicts after pollination by an apomict.

1162. BECK, W. A. and
JOLY, R. A. 581.331.23:578.08
Studies in pollen tube culture.
Stud. Institutum Divi Thomae, Cincinnati, 1941 : 3 : 81-101.

This article includes a description of a suitable technique for culturing pollen tubes. Agar containing 10% sucrose and a trace of yeast extract is the medium recommended. Vital staining is also discussed and the relative usefulness of various stains described.

1163. BEETLE, A. A. 582:001.4
Specific decapitalization.
 Chronica Botanica 1943 : 7 : 380-81.

The decapitalization of specific names is urged on the grounds of greater simplicity.

1164. CROIZAT, L. 582:001.4
The homonymy question.
 Madroño 1944 : 7 : 159-60.

It is suggested that Article 61 of the International Rules of Botanical Nomenclature should be modified so that homonymy should no longer be dependent on valid publication.

AGRICULTURE 63

1165. SAVIČ, V. P. 63.00.15(47)
 (Komarov Botanical Institute of the Academy of Sciences of the U.S.S.R. during 1941).
 Priroda (Nature) 1942 : No. 3-4 : 94-98.

In the first half of the year under review the team of workers at the above Institute concentrated upon the following problems: (1) Further development of the basic principles of Darwinism; (2) Systematics of flowering and spore-forming plants; (3) History of the flora and vegetation of the U.S.S.R.; (4) Studies of the flora of the U.S.S.R. as a basis of rational utilization of plant resources; (5) Regionalization of plant populations from the view-point of natural history; (6) Investigation of the natural plant resources of the U.S.S.R.; (7) Investigations of natural fodder resources; and (8) Soil erosion and methods for its control, etc. With the outbreak of war, the programme of work of the Institute was revised and has been mainly directed to providing for the needs of defence. Some of the new lines of work are outlined; they include methods of preparing sphagnum moss for medicinal purposes, preparation of vitamin concentrates from various sources, and production of medicinal substances from new sources.

1166. EGGBRECHT, H. 631.521.5
 Vereinfachung der Saatgutuntersuchung. (**Simplifying seed testing**).
 Forschungsdienst 1943 : 16 : 299-301.

Following upon his survey in 1942 of seed control methods, the author here briefly discusses some recent German investigations on the subject. The practical value of the biochemical test for germination is compared with that of the ordinary method of germination on sand.

1167. ANDERSON, E. 631.524:578.08:575.22
Mass collections.
 Chronica Botanica 1943 : 7 : 378-80.

The technique of mass collection and its usefulness for investigating the patterns of natural variation are described.

PLANT DISEASES AND PESTS 632

1168. QUANJER, H. M. 632:001.4
 Phytopathologische terminologie, met speciale bespreking van den begrippen biotrophie, premuniteit en antistoffen. (**Phytopathological terminology, with a special discussion on the concepts biotrophy, premunity, and anti-substances**).
 Tijdschr. PlZiekt. 1942 : 48 : 1-16; also Z. PflKrankh. 1943 : 53 : p. 200.
 [From Rev. Appl. Mycol. 1944 : 23 : p. 139].

The author supports the Committee on Technical Words of the American Phytopathological Society in its endeavour to formulate more accurate definitions of the concepts underlying terms such as "host", "susceptibility", "non-susceptibility", "resistance", "disease-escaping", "sensitivity", "non-sensitivity", "tolerance", "hypersensitivity", "necrotic abortion", "pathogen", "pathogenicity", "infection", "infect", "infectious", "inoculate", "infested", and "infest". Other terms are amplified or modified and some innovations are suggested. The definitions are in Dutch and English.

1169. ARK, P. A. 632.3:576.16:635.64
Studies on bacterial canker of tomato.
 Phytopathology 1944 : 34 : 394-400.

The fungus *Phytophthora michiganensis* (E.F.S.) Bergey *et al.* exists in several strains. White smooth, white rough, and pink forms are described which differ from the normal yellow strain in biochemical properties and pathogenicity.

1170. BISBY, G. R. 632.4:582°001.4
Nomenclature of fungi.
 Mycologia 1944 : 36 : 279-85.

The problems arising from application of the International Rules of Botanical Nomenclature to mycology are reviewed.

1171. BAKER, G. E. 632.421.2:581.6:575.125
Nuclear behavior in relation to culture method for *Penicillium notatum* Westling.
 Science 1944 : 99 : p. 436.

The effects of genetical variation and heterocaryosis on the penicillin yield of *P. notatum* are considered.

1172. DODGE, B. O. 632.421.9:575.125:577.8
A study of the inheritance of the factors for heterocaryotic vigor in *Neurospora tetrasperma*.
 Yearb. Amer. Philos. Soc. 1942 (1943) : 148-50.

The inheritance of heterocaryotic vigour has been studied in *Neurospora tetrasperma*. By culturing each of the dicaryotic ascospores of a single ascus and subsequent planting out of each of the two nuclear components of each original spore, it has been possible to demonstrate the presence of factors controlling sexuality and mycelial vigour. The action of such factors may be completely masked in the dicaryotic phase.

1173. LUCAS, G. B.,
 CHILTON, S. J. P. and
 EDGERTON, C. W. 632.421.9:581.162.5:575.247
Genetics of *Glomerella*. I. Studies on the behavior of certain strains.
 Amer. J. Bot. 1944 : 31 : 233-39.

The behaviour of *Glomerella* cultures isolated from *Ipomoea* sp., *Hibiscus esculentus*, *Pueraria Thunbergiana*, *Capsicum annuum* and *Pyrus Malus* has been investigated. Seven strains could be recognized in the *Ipomoea* isolate and these differed in such characters as colour, perithecia production and conidia formation. Some of these strains were similar to those recognized from the other hosts but in no case did perithecia form along the junction of cultures derived from different species. Several strains of the *Ipomoea* isolates produced perithecia in the absence of other types but production was increased in most cases by establishing contact between different strains.

Some strains bred true to type but others segregated at each generation, the causes of this behaviour being obscure. Sectorial mutants occurred frequently, the new types often resembling other strains.

1174. 632.422.3:575.243:537.531:581.192
 BEADLE, G. W. 632.422.3:575.243:535.61-31:581.192
Investigation of genes controlling known synthesis in the ascomycete *Neurospora*.
 Yearb. Amer. Philos. Soc. 1942 (1943) : 143-45.

By treating *Neurospora* with X-irradiation and ultra-violet light, it has been possible to obtain mutants unable to synthesize the following substances: thiamine, thiazole, pyridoxine, nicotinic acid, pantothenic acid, *p*-aminobenzoic acid, chlorine, adenine, uracil, arginine, leucine, lysine, methionine, proline, tryptophane and valine. Other mutants have shown abnormal fat metabolism, inability to reduce nitrates, and the loss of the capacity to form the yellow conidium pigment. Mutant strains usually differ from the normal by single genes and in some cases different genes have been found to block the same synthesis although at different stages. Since many of the mutant strains react quantitatively to the addition of the substance in which they are deficient, they should be useful in biochemical analyses.

1175. LEVAN, A. 632.422.3:581.04
On the ubiquity of the camphor reaction of yeast.
 Hereditas, Lund 1944 : 30 : 255-56. (Abst.).

About 50 different organic compounds have been found effective in inducing the camphor reaction of yeast.

1176. LINDEGREN, C. C. and HAMILTON, E. 632.422.3:581.16
Autolysis and sporulation in the yeast colony.
 Bot. Gaz. 1944 : 105 : 316-21.

Yeast sporulation is promoted by the autolysation products of the cells at the periphery of the colonies.

1177. LINDEGREN, C. C. and LINDEGREN, G. 632.422.3:581.16
Sporulation in *Saccharomyces cerevisiae*.
 Bot. Gaz. 1944 : 105 : 304-16.

A suitable pre-sporulation medium is recommended for *S. cerevisiae*.

Varietal differences in sporulation behaviour are reported, monosporial cultures and illegitimate diploids forming spores occasionally or not at all.

1178. LINDEGREN, C. C. and LINDEGREN, G. 632.422.3:581.162.5:575.41
Instability of the mating type alleles in *Saccharomyces*.
 Ann. Mo. Bot. Gdn 1944 : 31 : 203-11.

Haploid cultures of *S. cerevisiae* are unstable when isolated and may eventually become incapable of copulation. Such a sex neutralization is equivalent to a transformation from *Saccharomyces* to the artificial genus *Torula* or *Torulopsis*. Efforts to induce copulation by camphor were successful but nuclear fusion did not follow.

Variants of *S. cerevisiae* have also been found which copulate freely without regard to the *a/a* compatibility mechanism, a state of affairs typical of the genus *Zygosaccharomyces*.

These findings are discussed with reference to modern theories of natural selection.

1179. SPIEGELMAN, S. and LINDEGREN, C. C. 632.422.3:581.6:575.41
A comparison of the kinetics of enzymatic adaptation in genetically homogeneous and heterogeneous populations of yeast.
 Ann. Mo. Bot. Gdn 1944 : 31 : 219-33.

The ability of yeast to ferment galactose may be governed both by natural selection and direct cytoplasmic adaptation. The former mechanism has been demonstrated for dividing haploid strains and the latter for non-dividing diploid strains.

1180. NICKERSON, W. J. 632.422.3:582
Some trends in research on yeasts.
 Chronica Botanica 1943 : 7 : 409-12.

Recent work on the taxonomy and physiology of yeasts is reviewed. Several of the genera commonly recognized are doubtfully distinguishable but attempts to erect a more precise system of classification are hindered by lack of suitable taxonomic criteria.

1181. FISCHER, G. W. 632.451:582
Some evident synonymous relationships in certain graminicolous smut fungi.
 Mycologia 1943 : 35 : 610-19.

On the grounds of close morphological similarity, the following species might well be lumped: *Ustilago nigra*, *U. Avenae* and *U. perennans*, to be included under *U. Avenae*; *U. Hordei* and *U. Kollerii* under *U. Hordei*; *U. Tritici* and *U. nuda* under *U. Tritici*; and *Urocystis Agropyri* and *U. Tritici* under *U. Agropyri*. *Urocystis occulta* is similar to *U. Agropyri* but the spore balls have an incomplete investment of sterile cells.

1182. ARBUTHNOT, K. D. 632.7:576.16:575.125:633.15
Strains of the European corn borer in the United States.
 Tech. Bull. U.S. Dep. Agric. 1944 : No. 869 : Pp. 20.

Strains of *Pyrausta nubilalis* (Hbn.) the European corn borer have been differentiated according to their single or multiple generation habit and mating behaviour. F_1 hybrids, between races, although not easily accomplished, exhibit heterosis.

1183. NOŠOV, D. I. 632.951.1:575.127.2

(Interspecific hybridization in *Pyrethrum*).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 89-94.

The species *P. carneum*, *P. roseum* and *P. macrophyllum*, which grow wild in the U.S.S.R., are much hardier than *P. cinerariaefolium* and have been used for crossing. Hybrids have been obtained of *P. carneum* x *P. cinerariaefolium* and *P. macrophyllum* x *P. cinerariaefolium*. The former hybrid was intermediate in most characters but resembled *P. carneum* more closely in leaf form and *P. cinerariaefolium* in form and colour of the inflorescence. The hybrid with *P. macrophyllum* was intermediate in most characters; each stem had several inflorescences, which however were borne singly, not in umbels as in *P. macrophyllum*. Some of the *P. carneum* x *P. cinerariaefolium* hybrids had up to 400 glands on the ovary, which is therefore equal to the number characteristic of *P. cinerariaefolium*. The content of pyrethrin I in the hybrids varied from 0.2% to 0.65%; this latter figure is equal to the average for the cultivated species.

The hybrids were self-sterile and could not be back-crossed with the parental species. Efforts are being made to find a method of overcoming this sterility. Certain natural hybrids closely resembling the above described have been found and are also sterile.

1184. RAZDORSKAJA, L. A. 632.951.1:581.142:578.08

[A rapid method of determining the germination of seed of *Pyrethrum cinerarifolium* (Trev.)].

Priroda (Nature) 1943 : 3 : 66-69.

Several methods of determining the percentage germination of various seeds are discussed and the achene of *P. cinerarifolium*, which is larger than that of *P. carneum*, is described.

The method suggested by the writer for this plant and other species with light coloured pericarps and seed coats consists in steeping the seeds in alcohol in a covered dish for 24 hours, after which glycerine is added and the seeds allowed to stand for another 24 hours uncovered. They are then examined with a laboratory lens to determine the state of the ovary which can be clearly discerned through the pericarp. Any ovaries that are shrunken, black-tipped or have not been fertilized can be clearly detected. Floating and therefore useless seeds can also be identified at the time when the spirit is added.

The calculation of the percentage germination and the various applications of the above method are described, as well as its use for other insecticidal plants, e.g. *Matricaria Chamomilla*.

ECONOMIC PLANTS 633

1185. GUSTAFSSON, A. 633:537.531:581.48

The X-ray resistance of dormant seeds in some agricultural plants.

Hereditas, Lund 1944 : 30 : 165-78.

The resistance of the seeds of a number of economic plants to X-ray treatment has been investigated. Large differences in the dosages tolerated were discovered and it is suggested that seeds with a high fat content are less susceptible to injury.

1186. 633:575:575.3(43)

633.52:575(43)

Ergänzung der Sortenliste deutscher Kulturpflanzen. (Supplement to the variety list of German crop plants).

Forschungsdienst 1944 : 17 : p. 52.

The following varieties have been approved for cultivation in specific districts in Germany: Granum summer barley; Erbstorfer white oats; v. Nyssenscher maize for grain; Fredonia chicory and the Kujawischer land variety of linseed in the Wartheland district. The last named is a dual purpose flax for the production of fibre and oil for concentrates: it is being bred for improvement.

1187. ÅBERG, E. 633:582:001.4

Problems in the classification of cultivated plants.

Chronica Botanica 1943 : 7 : 375-78.

The diverse systems at present in use for the classification of cultivated plants are reviewed. More detailed knowledge of the extent of natural variation has shown that a narrow concept of the species is inapplicable; neither is a very wide definition to be recommended. The writer advocates a moderate size for the species and then discusses the rationale of subspecific categories. Nomenclature of these smaller units is unsettled, the term variety being used in two quite different

senses; an English equivalent of the German "Sort" is desirable. Taxonomic study should keep abreast with the production of new forms by plant breeders and an adequate technique for classification of the various cultivated types should be devised.

1188. CICIN, N. V.,
 LISICYN, P. I. and
 JURJEV, V. JA. 633.00.14(47)
 (The results of the state varietal tests for 1939. Part I: Winter wheat, rye, barley; Part II: Spring wheat, oats, spring barley, rice; Part III: Peas, lentils, *Phaseolus*, soya bean, *Lathyrus sativus*, *Cicer arietinum*). Gosudarstvennaja Komissija po Sortoispytaniju Zernovyh Kul'tur pri N.K.Z. S.S.S.R. (State Commission for the Organization of Varietal Tests of Cereal Crops attached to the Peoples' Commissariat of Agriculture of the U.S.S.R.), Moscow 1941: Pt I: Pp. 260; Pt II: Pp. 400; Pt III: Pp. 134.

The subject matter is treated in each of the above volumes in an identical manner. There is a short review, prefacing the text, embodying the information on the areas occupied by each respective crop, on their relative importance in agricultural economy in the past and during the period under review, on the meteorological conditions prevailing during 1938 and 1939, and on the methods of agricultural technique employed in the conduct of the trials. This is followed by a detailed account of trials carried out in each of the federated republics and in each administrative sub-division thereof. A list of the more promising varieties, both Russian and imported, for each locality concludes the descriptive part. Statistical tables form by far the greatest bulk of each volume.

The comprehensive tables dealing with yields of each crop in individual regions are finally subjected to statistical analysis; the recommendations, or otherwise, that certain varieties should be used in preference to others in different regions are based on the interpretation of the mathematical analysis. At the end of each volume there is an index, by consulting which one may quickly find the data relating to the yields of each particular crop in individual administrative and geographical regions.

Part I.

In the autumn of 1938 a total area of 36.7 million ha. was under winter cereals, rye, wheat and barley accounting for 20.7, 15.2 and 0.8 million ha. respectively. Four hundred and forty one varieties were tested during 1939; among which there were 322, 43 and 76 varieties of winter wheat, winter rye and winter barley respectively. In addition, a large number of the locally grown varieties were tested as well. The majority of the so-called selected varieties were found to be deficient in winter hardiness, in their resistance to disease or lodging, or had unsatisfactory milling and baking qualities. The best yields of the Ukrainka, Lesostepka and Krasnodarka varieties of winter wheat were 26.1 to 40 and over, 29.1 and 29.3 centners per ha. The yields of winter rye fluctuated from 4.7 to 45.0 centners per ha. according to the meteorological and soil conditions. Winter barley is grown in the regions with a mild climate; the best varieties yielded in some localities 21.2 to 26.2 centners per ha.

Part II.

In 1938 there were 26.9, 17.9 and 8.5 million of ha. under spring wheat, oats and barley respectively. In 1939 tests were conducted with 372, 135 and 199 varieties of wheat, oats and barley respectively. The following varieties were recommended for commercial production: Wheat—Washington, Milturum 553 and Artemovka (*Lutescens* 1418); Oats—Record, Vydviženec [Outstanding], Orohoiskii A-547; and Barley—Kubanec, Nutans 1386-2, Submedicum 199 and Nutans 17 (Uzbek). The yields fluctuated from 3.4 to 37.6, 30 to 47.1, and 2.6 to 37.5 centners per ha. in the case of wheat, barley and oats respectively. A total area of about 145,000 ha. was under rice in the U.S.S.R. of which 76,700 ha. (45.9%) were in the Uzbek S.S.R., and the remaining 54.3% distributed in the Kirgiz, Kasah and Azerbaïdžan S.S.Rs and in the Maritime Province (Far East). There were 68 varieties under trial during 1939. Whilst the average yields were mostly from 15 to 25 centners per ha., they rose to 50–60 c. per ha. in some localities.

Part III.

The total area under peas, lentils, *Phaseolus*, soya bean, *Lathyrus sativus* and *Cicer arietinum* was 1643.6 in 1939, 608.7 in 1939, 130.7 in 1937, 223.9 in 1939, 80–90 in 1939 and 4.8 in 1937, thousands of ha. respectively. There were 48, 44, 70, 55, 14 and 30 varieties of peas, lentils, soya beans, *Lathyrus sativus* and *Cicer arietinum* respectively under trial during 1939. The yields fluctuated from 3.4 to 31.5, 3.6 to 20.1, 2.0 to 22.3, 3.4 to 32.4, 5.5 to 26.6 and 3.0 to 24.3 centners per ha. for each of the above crops.

H. F.

1189. EICHMEYER.

Norwegische Getreidesorten. (Norwegian cereal varieties).

Mitt. Landw. 1943 : 58 : p. 338.

Three oat varieties bred in Sweden, are cultivated in Norway, namely Adler (Eagle), Silber (Silver) and Goldregen II (Golden Rain II). In the Trøndelag district the Norwegian variety from a cross between Thors and Strind oats is now grown. In the mountainous parts Perl and Hein and the new variety Ymar are grown. The leading varieties of barley are the Danish Kenia and Maja, and also Opal B. The variety Freia is earlier than Maja and has as good a yield. In the southern coastal districts Asplund, Varde, Herse and Bonus are grown. For the mountain districts the Norwegian varieties Jotun and Polar are recommended. The wheats grown are Diamant II and Fram II. Other varieties are Aas and Snögg (Rapid) and in the cold districts the Russian Siberian barley.

In rye there is competition between Petkus and the Norwegian summer or spring rye. R. M. I.

1190. *KIHARA, H.

633.1:576.312.32:576.16

Anwendung der Genomanalyse für die Systematik von *Triticum* und *Aegilops*.(Using genome analysis for the study of the systematics of *Triticum* and *Aegilops*).

Jap. J. Genet. 1940 : 16 : 309-20.

Having reviewed the origin of the study of genome analysis in Japan, the underlying principles of homology and the conjugation of homologous chromosomes in meiosis are stated and exemplified by detailed reference to the lecturer's genome analyses of wheat and *Aegilops*. The statistical probability of the elimination of univalents in the hybrids from *Drosera* (AAB) and *Pygaera* (AB) type hybrids is an important factor in determining the sterility of these two types. The practical methods of determining fertility are enumerated, e.g. selfing, crossing, and pollen examination.

In discussing the fertility of interspecific *Triticum* and *Aegilops* hybrids of the first and second types, results obtained by the author and by Matsumura *et al.* (already reviewed in "Plant Breeding Abstracts") are fully discussed.

The great influence of the plasma upon fertility in interspecific wheat hybrids is stressed by comparing the results of crossing an *Aegilops caudata* x *T. vulgare* hybrid with *T. vulgare* and the reciprocal cross.

In the author's opinion the genome analysis of wheat shows it to be an allohexaploid with genomes ABD. *T. vulgare* contains AABB, derived from *T. dicoccum*, and DD derived, it is suggested, either from some extinct or still undiscovered type in Afghanistan or Iran. Existing AB plants are resistant to rust and so are the AABB plants obtainable from pentaploid hybrids (AABBD) and it is therefore suggested that susceptibility comes from DD, which may account for the extinction of DD plants owing to their weak resistance to rust. Moreover, if a DD plant does exist at the present day, it must bear some rust resistance character which could be exploited in combating rust in wheat.

The use of the symbol G for the partially homologous genome of *T. Timopheevi* is suggested (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1438).

The botanical characteristics of *Aegilops* are described and the results of genome analysis of this genus are given, together with a classification of the component species. This account is regarded as an improvement on the 1940 table already published (cf. "Plant Breeding Abstracts", Vol. X, Abst. 745), the final stage of this part of the work having been almost reached.

Evidence tending to show that the formula of *Ae. triuncialis* is C^uC and not C^uT may, it is believed, be obtained from amphidiploid hybrids between *Ae. triuncialis* and *Ae. caudata* and *Ae. umbellulata*.

In discussing the problems of taxonomy, and genome and karyotype analysis, Senjaninova-Korčagina's karyotype analysis of *Aegilops* is critically reviewed in the light of the author's own findings (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 844).

1191. CHESTER, K. S.

633.1-2.452-1.521.6:575.12:578.08

Methods of appraising intensity and destructiveness of cereal rusts with particular reference to Russian work on wheat leaf rust.

Plant Dis. Reporter Suppl. 1944 : No. 146 : 99-121. (Mimeographed).

The various techniques of estimating the extent of rust damage to cereals are discussed with

* A full translation of this paper is on file at the Bureau.

special reference to Russian methods. Special attention is paid to methods of comparing the yields of susceptible and resistant varieties and of comparing the yields of segregates derived from hybridization.

1192. ÅKERMAN, Å.,
JAKOBSSON, J. and
LINDBERG, J. 633.1:664.641.016(48.5)
Undersökningar av kvaliteten hos 1942 års brödsädesskörd. (**Investigations of the quality of the bread cereals harvest of 1942**).
Sverig. Utsädesfören. Tidskr. 1943 : 53 : 239-74.

Full details are given of the methods, range and results of a study of the quality of bread cereals in Sweden.

1193. 633.1.00.14(43)
633.854.54.00.14(43)
Zulassung neuer Sorten deutscher Kulturpflanzen. (**Approval of new varieties of German crop plants**).
Mitt. Landw. 1943 : 58 : p. 893.

After exhaustive trials under the variety register scheme, the districts approved for the cultivation of the new cereal varieties Granum, spring barley, Elstorfer white oat and Nyssen maize (for grain) are specified.

Similar information is given for two new strains of winter rape bred by Dippe Bros, and the Kujanischer land race of linseed.

WHEAT 633.11

1194. REITZ, L. P. and
LAUDE, H. H. 633.11:575(78.1)
Comanche and Pawnee: new varieties of hard red winter wheat for Kansas.
Bull. Kans. Agric. Exp. Sta. 1943 : No. 319 : Pp. 16.

The two recently introduced wheat varieties Comanche and Pawnee are described (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 1200) and details appended as to their performance in Kansas.

1195. ERITZIAN, A. A. 633.11:575.127.2:576.16
(**On the study of the form building processes in inter-species crossings of wheat**).
Trav. Inst. Bot. Tbilissi 1940 : 7 : 135-80.

In investigating the phylogeny of Georgian plants a study was made of the endemic species *Triticum Timopheevi* Zhuk. from the standpoint of its phylogeny and its economically useful characters for the controlled production of new and other forms. Its distribution and cultivation in Georgia and its morphological, biological and cytological features are described. Three types of chromosomes were found to occur in all the forms of *T. Timopheevi* studied, thus confirming the morphological uniformity of the species.

The problem of the origin of *T. Timopheevi* is not yet solved.

In the present study cyclic crossing was used and the crossability of *T. Timopheevi* with 14, 28, and 42 chromosome wheats is recorded with notes on the cytological findings in various crosses. Two groups of crosses were made: (1) in which uncontrolled cross-pollination was possible owing to the presence of a botanical collection in the vicinity of the hybrids and (2) in which isolation ensured that pollination could only occur within the combination made.

Full details are given of the genetic behaviour and the alphabetical method used for indicating the constitution of transitional forms of the various hybrids from the point of view of the species characters exhibited.

In group I form production showed a wide range, the hybrids including many new species and varieties as well as a considerable number of transitional forms intermediate between species, while in group II the range of form production was smaller, being confined to new varieties produced by recombination of intraspecific characters within the limits of the original species. In group I in some crosses complete disappearance of the parent forms was observed, while in group II the parent forms persisted, with predominance of the maternal species. The different behaviour in the second group is attributed to the type of flowering in the hybrids and to the

conditions under which the fertilization of the hybrid gametes occurred. A special study of flowering in various wheats as well as those in the plots in present study was made; anomalies in the development of the male reproductive organs in hybrid florets of *T. Timopheevi* were also observed which tended in group I to facilitate out-pollination and selective fertilization by pollen from the various types in the botanical collection and hybrids of the other crosses, whereas in group II this selective capacity was limited. This accords with the difference in the range of form production observed in the two groups.

Four new constant hybrid varieties of *T. Timopheevi* (which is termed an "accumulator" of valuable characters) are described.

1196. SEARS, E. R. 633.11:575.127.5:633.11Aegilops:575.113.7
Inviability of intergeneric hybrids involving *Triticum monococcum* and *T. aegilopoides*.
 Genetics 1944 : 29 : 113-27.

Two alleles in *Triticum monococcum* which act as dominant lethals in hybrids between that species and *Aegilops umbellulata* are shown to have no effect on *T. monococcum* itself. The lethals differ in the earliness with which they cause death in the hybrid seedlings. The author finds semi-lethal conditions apparently monofactorially determined in hybrids of *Ae. bicornis* with certain *Triticum* varieties. The failure of *T. monococcum* to cross with *Haynaldia villosa* is also probably due to a single factor.

1197. LEIN, A. 633.11:575.127.5:633.14:581.162.5:575.11
 Die genetische Grundlage der Kreuzbarkeit zwischen Weizen und Roggen.
 (The genetical basis of the crossability between wheat and rye).
 Z. induct. Abstamm. -u. VererbLehre 1943 : 81 : 28-59.

The wheat variety Chinese 446 gives a high percentage seed set when crossed with rye; Marquis and Peragis give low sets while Blausamtiger Kolben [Blue Velvet Kolben] is intermediate. From the analysis of the progenies obtained by intercrossing these wheats, the following genetical constitutions are proposed: Chinese 446, $kr_1 kr_1 kr_2 kr_2$; and Marquis and Peragis, $Kr_1 Kr_1 Kr_2 Kr_2$. The intermediate character of Blausamtiger Kolben may be due to the presence of the gene kr_2 but this has not been confirmed.

Gene kr_2 is weaker in its promotion of seed set than kr_1 and the latter gene is incompletely recessive when heterozygous. No evidence of plasmatic inheritance was obtained, reciprocal crosses giving equivalent results.

These results are discussed with reference to the importance of sterility barriers in evolution and some account of the geographical distribution of the gene is also included.

1198. ERDTMAN, G. 633.11:575.127.5:633.14:581.331.2
 Sädesslagens pollenmorfologi. (Pollen morphology of the cereals).
 Svensk Bot. Tidskr. 1944 : 38 : 73-80.

A detailed examination was made of the pollen morphology of a number of varieties of oats, barley, rye and wheat and of two races of *Triticale*. In *Triticale* Rimpau the number of pores varied from 1 to 5 and in "*Triticale* C" from 0 to 3. The size of the pollen grains was also very variable, the grains with several pores being generally the largest. The variation in pollen size was greater in *Triticale* Rimpau, in which the meiotic irregularities are greater than in *Triticale* C. The pores were sometimes of the wheat type and sometimes of the rye type.

1199. KOVALEVA, P. G. 633.11:575.127.5:633.289
 (Notes on work on the crossing of *Agropyron* species with wheat).
 Vestnik Gibriziacii (Hybridization) 1941 : No. 2 : 99-100.

The following species of *Agropyron* were crossed at the Bezenčuk breeding station with *Triticum durum*, *T. persicum*, *T. Timopheevi* and *T. polonicum* and the soft wheats: *A. intermedium*, *A. trichophorum*, *A. obtusiusculum* [sic]* and *A. elongatum*. The soft wheats were autumn forms and the hard, mainly spring forms.

With all the species of *Agropyron* the highest percentage set was obtained from the crosses with the soft varieties and the lowest percentage in the crosses involving *T. persicum*. Of the *Agropyron* species, *A. glaucum* gave the lowest set when crossed with the wheats, and *A. elongatum* the highest.

* *A. obtusiusculum*?

On back-crossing the hybrids from soft and hard wheats crossed with *A. intermedium*, to counteract the F_1 sterility, the best set was obtained with soft wheat pollen, i.e. from 1.5 to 6.1%, while the corresponding figures for the hard wheats were 0.2 to 0.9%.

Under the conditions at the station all *Agropyron* species (except the local ones) comprised winter, semi-winter and spring forms. The local types and *A. elongatum* were very winter-hardy and the latter species had the longest vernalization stage. The *Agropyron* species varied in the length of the second stage. The F_1 intergeneric hybrids were perennial forms of marked vigour. The F_1 from the crosses between autumn wheats and the local *Agropyron* were the most winter hardy, while the F_1 hybrids from the combination of autumn wheats with *A. glaucum* were the least so, the percentage that survived the winter being 65.8% for the former and 29.2% for the latter. Figures for the F_3 and F_4 generations show that, with few exceptions, crosses between spring wheats and the various *Agropyron* species used did not produce winter hardy forms.

In 1940, 57 of the best F_4 strains superior to the standard Lutescens 1060/10 in various economic features were sown in the nursery. Some of them were perennial and showed high tillering capacity and a cultivated type of ear and grain and good threshing qualities, as well as being resistant to fungous diseases. In addition, 158 superior clones were chosen for their potential value in the breeding of perennial wheats.

Hybrids between wheats and local *Agropyron* forms deserve attention for their drought resistance.

1200. POPOVA, G. I. 633.11:575.127.5:633.289
(Fertility in wheat x *Agropyron* hybrids).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 15-20.

T. Timopheevi, on account of its extreme tolerance of adverse conditions, its vitreous grain, high tillering capacity and exceptional immunity to fungous diseases, would be one of the most valuable species for breeding but for the difficulty of crossing it with other wheat species. Several amphidiploids have been obtained from it but the problem is still a long way from being solved. Hybrids were made between *T. Timopheevi* and *A. glaucum* and *A. elongatum*. The hybrids were very sterile, especially the latter, but a few grains were formed by open pollination when the hybrids were planted at wide intervals and wheat was sown in the intervening spaces at a number of successive sowing dates. In 1937 four heads of each combination were pollinated at ten-day intervals in the following ways: (a) after emasculation of all the flowers in the ear, (b) without any emasculation, and (c) without emasculation of the two lower florets, whilst removing the upper florets. In all cases freshly gathered pollen of *T. Timopheevi* was used for pollination. No grain at all was produced.

The details of the cytological behaviour of hybrids of *T. Timopheevi* with *A. glaucum*, *A. elongatum* and various species of wheat show great analogies. No difference was observed in the cytological behaviour of the hybrids when fixed at different times. The *T. Timopheevi* x *A. elongatum* hybrids mostly had 21 bivalents and 7 univalents and those with *A. glaucum* had 2-7 bivalents; the other irregularities of meiosis were also more pronounced in the latter hybrid than the former and polyads were frequently formed; nevertheless all plants produced a certain number of pollen grains of normal appearance, and the grain formation was higher than in the hybrid with *A. elongatum*, where no polyads were formed but also no normal pollen grains and only one grain set during two years. A parallel observation was made in hybrids of *T. Timopheevi* with wheat species: those with *T. persicum* formed up to 14 bivalents but were less fertile than those with *T. dicoccum* which formed only 7 bivalents.

1201. SMITH, D. C. 633.11:575.127.5:633.289
Intergeneric hybridization.

Chronica Botanica 1943 : 7 : 417-18.

The work done on *Triticum* x *Agropyron* hybridization in Russia, the U.S.A. and Canada is reviewed.

1202. 633.11:575.129:581.04
633.11:575.127.2:576.356.5:581.04

ŽEBRAK, A.
(Synthesis of new wheat species).

Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) Moscow 1943:
No. 8 : 51-57.

The author defines the species from the cytogenetical standpoint and mentions the role of polyploidy in the evolution of species, the colonization of areas with climatic extremes and the

origin of many cultivated plants. The first amphidiploid wheat obtained by the author with colchicine was a 42-chromosome constant breeding hybrid of *Triticum durum* and *T. monococcum* obtained in 1938; it was a late, winter form with larger grains than either parent.

In the same year colchicine was applied to the *T. durum* x *T. Timopheevi* hybrids and an amphidiploid with 56 chromosomes was obtained. Large scale crossing of *T. Timopheevi* with other wheat species and varieties was then started and some 200 different combinations were made. In 1940 33 amphidiploids were obtained and in 1941, 52. The 56-chromosome amphidiploids have been obtained in crosses of *T. Timopheevi* with 5 different species, representing 32 distinct botanical varieties. Furthermore, 70-chromosome amphidiploids have been produced from crosses of *T. Timopheevi* x *T. vulgare*.

All the 56-chromosome amphidiploids have group immunity and have exceedingly large grains, and a number of other features in common. They are all therefore classed as *T. soveticum*. They are all winter forms and can be autumn sown in the Moscow area.

A 56-chromosome amphidiploid between *T. durum* and *T. polonicum* has also been produced but it is lower in fertility than the unreduplicated F_1 , which in this cross is fertile.

The 1000-grain weight of the 56-chromosome *T. orientale* x *T. Timopheevi* hybrid was 95 grm. and the 1000 best grains of some of the other amphidiploids weighed as much as 100 and 110 grm. The grain of most of the amphidiploids is somewhat shrunken but some individuals have well-filled grain and it is thought that this character could be improved by selection. Although the amphidiploids do not segregate for the main morphological characters, variation is observed in such features as length and density of ear, pubescence of glume and time of maturity.

1203. LAUDE, H. H. 633.11:575.74:575.125:631.557
Long-time wheat variety yield comparisons.
 J. Amer. Soc. Agron. 1944 : 36 : 152-61.

A number of wheat varieties have been compared over a long period and significant changes in the relative yields of varieties over the period are recorded. For instance, during the first 15 year period the yield of Kanred was 3.1 bushels higher than Turkey, but during the next 16 years, the difference only amounted to 0.7 bushels. The gradual decrease in yield of new varieties over a period is well known and the author suggests that many new varieties may owe their higher yield partly to hybrid vigour which gradually disappears with the attainment of homozygosity.

1204. ILLARIONOV, V. F. 633.11:581.165.71:633.14
(Grafting wheat on rye).
 Vestnik Gibrizizacii (Hybridization) 1941 : No. 2 : 101-02.

This paper deals mainly with the technique from the following aspects: (1) the optimum age for fusion of scion and stock; (2) the best method of incision, to ensure fusion; (3) the best means of splicing stock and scion; and (4) the best way of looking after the graft to facilitate fusion. Some experiments in grafting wheat on rye are briefly recorded with special reference to the influence of environmental factors.

The method is to be used for grafting wheat on rye directly in the open in 1941.

1205. SALTYKOVSKY, M. I. and 633.11-2.111-1.521.6:575.114
 SAPRYGUINA, E. S.
Synthesis of winter-hardy wheats.
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1943 : 39 : 280-83.

Evidence is presented in favour of the hypothesis that transgression for cold resistance may be obtained by hybridizing varieties similar in winter hardiness but differing strongly in the length of their developmental phases.

1206. WOODWARD, R. W. and 633.11-2.451-1.521.6:575.12
 TINGEY, D. C.
Cache, a beardless, smut-resistant winter wheat.
 Bull. Utah Agric. Exp. Sta. [1944] No. 312 : Pp. 10.

Cache, formerly known as 54a-40 or C.I.11599, is a beardless wheat having a high degree of resistance to the races of bunt and smut common in Utah. It was selected from the progeny of the cross Redit x Utah Kanred.

OATS 633.13

1207. REED, G. M. 633.13-2.451.2:576.16:631.521.6:575.11
Reports on research for 1943. Plant pathology.
 Brooklyn Bot. Gdn Rec. 1944 : 33 : 9-11.

Further work is reported on the mode of inheritance of resistance to oat smut races. The monofactorial type of resistance to race 1 of covered smut in the cross Victoria x Monarch has been confirmed.

1208. VALLEGA, J. 633.13-2.452:576.16(82)
 Razas fisiológicas de *Puccinia graminis avenae* halladas en Argentina.
(Physiological races of *P. graminis Avenae* found in Argentina).
 Rev. Fac. Agron. B. Aires 1943 : 3 : 517-29.

Samples collected in 1939-41 were found to contain only races 3 and 7, which were equally abundant and had the same geographical distribution. These two races are among the most virulent known and all varieties of S. American origin tested have proved susceptible to them. Imported varieties that have been found resistant comprise Richland, Iogold and Green Russian, their hybrids, and Hajira and some of its hybrids with Joannette.

1209. STAKMAN, E. C. 633.13-2.452:576.16:631.521.6
 LOEGERING, W. Q.
The potential importance of race 8 of *Puccinia graminis avenae* in the United States.
 Phytopathology 1944 : 34 : 421-25.

Races 8 and 10 of *P.g. Avenae* have become more abundant in recent years and are widely distributed in North America. A further increase may seriously affect the yields of varieties deriving their rust resistance from Richland which is susceptible to these two races.

RYE 633.14

1210. *KRASNJUK, A. A. 633.14:575.127.5:633.289
(Rye-*Agropyron* hybrids).
 Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 3-14.

Eliseevskaja rye was pollinated with *A. cristatum* and from several hybrid grains produced one mature plant was obtained. The growing plant was scarcely distinguishable from the maternal rye but *Agropyron* characters were observable in the ear. The hybrid flowered some days after the rye parent but before the *Agropyron* parent. The stigma appeared normal but the anthers failed to dehisce, the pollen grains being transparent and incapable of germination. The hybrid was perennial and could easily be reproduced vegetatively. It was highly resistant both to drought and frost, and never showed any signs of damage after the winter. The subsequent spring growth was more luxuriant than that of the original parental forms. Tillering was very prolific in the hybrid, which produced up to 150 tillers per plant. The plant was intermediate in height. It produced no grains when artificially pollinated from the parents or other hybrid plants but a few grains formed by open pollination with different forms of rye and *A. cristatum* when these were induced to flower simultaneously with the hybrid.

The grains of the F₂ plants were naked, fairly well filled, and with a thousand corn weight of 5.45 gm. as compared with 2.95 gm. in *A. cristatum*. In form the grains showed a closer resemblance to *A. cristatum*. The embryo development and germination capacity were somewhat low; when germination occurred the seedlings were sometimes weakly and died before maturity. Among the plants that reached maturity four groups were distinguishable: (a) a common rye type and perennial forms, (b) like the first generation, (c) intermediate, (d) *Agropyron* type. The second, third and fourth groups were perennial and gave a spring growth of the *Agropyron* type. The second group is of the greatest interest from a practical standpoint, especially plants Nos 1683 and 2063, which gave a good autumn and especially spring growth and had a well developed root system. The perennial hybrids were highly drought and frost resistant. The F₂ plants approached the rye parent in height but much exceeded it in tillering, having 76-102 stems per plant. The length of the ear was close to that of rye, except in the couch group, where it was long and lax. The number of florets per spikelet in all groups approached that in *Agropyron*. Their average grain production was low.

* An extended abstract of this paper is on file at the Bureau.

No. 1683 was the best hybrid from all practical standpoints. It also distinguished itself in respect of autumn and spring growth and root development. It developed well in summer too and stood out clearly among the other hybrids. It was as tall as rye and had 10-15 times as many tillers; the foliage was of the rye type and tender. Its ears were similar to the other hybrids, its fertility was high, and it yielded 23.8 grains per ear, with a total of 11,205 grains; it produced an abundance of pollen, in contrast to the other plants of the group, in most of which the anthers failed to dehisce. This hybrid is thought to be very promising as a new perennial fodder plant.

Among the other hybrids of this group, No. 834 gave a total yield of 5026 grains, with an average of 19.3 grains per plant. Its flowering was almost normal but its tillering capacity was somewhat low. No. 2083 gave a good autumn and spring growth and had an abundance of tender foliage; it yielded a total of 8345 grains per plant, with an average of 10.9 grains per ear.

No valuable forms have been selected from the intermediate group, in which the fertility was only about 0.5 grains per ear.

The couch group is most interesting as a bridge for further crossing. Its foliage is too coarse and sparse to be of direct interest for fodder purposes.

The plants of the rye group were scarcely distinguishable from common rye. Only 3 such plants have been observed so far. Their fertility is normal and sometimes even higher than that of Eliseevskaja rye; the ear is of a completely cultivated type and the grain good.

In the third generation the hybrids of the rye type, sown under field conditions, differed very little from Eliseevskaja rye, except that they yielded 69.9 grm. of grain from 50 ears as against 57.5 grm. in the rye and their fertility was 87.9% as opposed to 82.0% in rye. The ear was dense and the grain almost enclosed.

The F_3 hybrids of the perennial type mostly had partially enclosed grain similar to that of *A. cristatum* in size and form, slow in germinating capacity. Again hybrids 1683 and 2083 gave the best results.

In the fourth and later generations the grain of the perennial group was partially enclosed and very little different from *A. cristatum* grain. The F_4 and later generations of the rye type have been subjected to further selection and 17 lines of them were included in the 1941 rye variety trials.

1211. MÜNTZING, A. 633.14:576.356.2
**Cytological studies of extra fragment chromosomes in rye. 1. Iso-
 fragments produced in misdivision.**
 Hereditas, Lund 1944 : 30 : 231-48.

The cytology of rye plants derived from a parent containing one extra chromosome fragment is described. Considerable variation among the progenies was observed, several new types of fragment being present in the metaphase plates. The new forms are believed to have arisen from the pre-existing fragment by misdivision of the centromere resulting in the formation of telocentric portions. These in turn misdivided to form isochromosomes.

No evidence of homology between the fragments and the normal chromosomes could be discovered.

MAIZE 633.15

1212. JENKINS, M. T. 633.15:575(76.8)
**Report of the Third Southern Corn Improvement Conference held at
 Memphis, Tennessee, February 5, 1942.**
 Div. Cereal Crops Dis., Bur. Pl. Ind. Sta., Beltsville, Maryland 1942 : Pp. 22.
 (Mimeographed).

Reports are given of the maize breeding programmes in progress at the southern agricultural experiment stations. Breeding is almost entirely concentrated upon the production or selection of inbred or single cross lines for use in producing hybrid maize of both white and yellow varieties. Characters particularly studied include high yield, wide adaptation, large ears, good husks covering resistance to lodging, to ear rots and to earworm damage, and the ability to keep well when stored.

The U.S. Department of Agriculture is also co-operating with the southern stations in the production of inbred lines and particular attention has been paid to the selection of long-husked types. Several selected inbreds have been top-crossed and are ready for yield trials. An attempt is also being made to produce a yellow seeded strain of Thompson Prolific.

1213.

633.15:575(77.7)

633.15:575.11(77.7)

Report on agricultural research for the year ending June 30, 1943.**Part II—Iowa Corn Research Institute Eighth Annual Report.**

Iowa 1943 : Pp. 79.

Significant differences have been found in the chemical composition of the endosperm of the four genotypes *Wx Wx Wx*, *Wx Wx wx*, *Wx wx wx* and *wx wx wx*: it is clear therefore that *Wx* cannot be regarded as completely dominant. Studies on the genes determining the glossy seedling phenotype have shown that *gl₄* is located on chromosome IV, *gl₆* on chromosome III, *gl₈* on V, *gl₉* on X, *gl₁₀* on IX and *gl₁₂* possibly on VIII. No linkages could be discovered between *gl₅* and *gl₇*, and any of the ten linkage groups. Endosperm colour is determined by at least 3 or 4 genes which interact in a complex fashion; several hypotheses on the mode of interaction, all in agreement with the facts, are being further tested. Seed longevity is genetically determined and there is some evidence also of maternal effect. A new recessive mutant *gt* determines giant habit, the double recessives being 2-4' higher than the normal plants, having 25 nodes, and maturing 2 weeks later.

Two types of mutation have been distinguished in *Phytomonas Stewartii*. The first or stable type is characterized by a rate that increases linearly with temperature and is believed to be caused by a chemical change in the gene. The rate of the second or unstable type bears no such simple relationship to temperature and may be a chromosomal effect. Various mutations affecting virulence are described.

Inbreds and the progeny of the open-pollinated variety Krug are being selected for resistance to *Diplodia Zeae*.

Studies on sweet corn improvement have included the development of superior inbred lines of Golden and Country Gentleman. Sweet corn inbreds have been crossed to waxy maize lines, the hybrids being subsequently selfed and back-crossed.

A negative correlation between straw stiffness and yield has been established for popcorn. Popping volume is an heritable character, high volume being partially dominant.

1214. SINGLETON, W. R.

633.15:575.125

Hybrid vigor in the intra-inbred cross P39 x C30 in maize.

Rec. Genet. Soc. America 1943 : No. 12 : 52-53. (Abst.).

C30, an inbred maize line derived from P39, gives rise to heterotic offspring when crossed with P39.

1215. MANGELSDORF, P. C. and

CAMERON, J. W.

633.15:576.16(72.81)

Western Guatemala a secondary center of origin of cultivated maize varieties.

Bot. Mus. Leaflet. Harv. 1942 : 10 : 217-52.

The department of Huehuetenango in western Guatemala is the seat of a great diversity of maize varieties, a range of 1 to 14 chromosomal knobs being found. Teosinte and *Tripsacum* are also abundant. It is suggested therefore that this region is a secondary centre of origin of maize varieties, new forms having been produced by hybridization between *Zea* and *Tripsacum*, a cross that is believed also to have given rise to *Euchlaena*. Low knob number is associated with high altitude as it is in the Andes and correlations also exist between the number of knobs and several morphological characters derived *ex hypothesi* from *Tripsacum*. The potential breeding value of the Guatemalan genes is indicated.

1216. REEVES, R. G.

633.15:576.312.342:576.16:581.9

Chromosome knobs in relation to the origin of maize.

Genetics 1944 : 29 : 141-47.

The numbers of knobs on the chromosomes of indigenous maize varieties from the countries of North, Central and South America are taken as an indication that maize preceded and was a parent of teosinte. The highest average number of knobs is found in the Guatemalan types, with a large number also in those from the U.S.A., Mexico, Venezuela, Colombia and Uruguay. This is thought to indicate that the original knobless forms of maize, which originated in the Andes, hybridized with the knobbed-chromosomal type *Tripsacum* in Central America, producing the knobbed-chromosome teosinte; this, by repeated back-crossing to maize, gave rise to a new tripsacoid type with knobbed chromosomes which spread rapidly into North and South America. Its distribution in the Andes was limited, however, by the presence of the old knobless forms in these regions.

1217.

633.15-1.524(72.81)

Corn for tropics being developed.

Agric. Amer. 1944 : 4 : p. 76.

A recent investigation of Guatemalan maize varieties has brought to light several types with unusual adaptability to tropical conditions.

1218.

ANDERSON, E.

633.15-1.524:582

A cytological, taxonomic, and genetic monograph of the genus *Tripsacum* with reference to its allies *Zea* and *Euchlaena*.

Yearb. Amer. Philos. Soc. 1942 (1943) : 142-43.

A collection of *Tripsacum* and maize varieties is being maintained at the Missouri Botanical Garden and herbarium specimens have been prepared from these and other collections.

1219.

ROBINSON, J. L. and

REISS, F.

633.15.00.14(77.7)

The 1943 Iowa corn yield test.

Bull. Ia Agric. Exp. Sta. 1944 : No. P58 : 852-903.

A detailed account is presented of maize varietal tests held in Iowa during 1943. Trials were laid down in twelve different localities, a triple lattice field design was adopted, and analyses of variance for each district and the coefficients of variability calculated.

1220.

WHIDAKAS, W. and

LEARY, W. J.

633.15.00.14:575.12(78.4)

1942 hybrid corn field trials.

Agron. Mimeo. Circ. N. Dak. Agric. Exp. Sta. 1943 : No. 74 : Pp. 19.

Variety trials of maize in North Dakota are reported, special attention being paid to yield, percentage moisture of the ears, and the time required for maturity.

BARLEY 633.16

1221.

SWANSON, A. F. and

LAUDE, H. H.

633.16(78.1)

Barley production in Kansas.

Bull. Kans. Agric. Exp. Sta. 1943 : No. 318 : Pp. 38.

Descriptions of the more important Kansas barley varieties are given together with an account of their yielding ability.

1222.

SAVINSKAJA, V. F.

633.16:575.12:575.11(47)

(A case of natural hybridization in barley).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 106-07.

Types of barley that differ ecologically and geographically also differ in the amount of cross-pollination they exhibit. In the Abyssinian, Japanese and the wild form, var. *spontaneum*, from Syria, Transcaucasia and Central Asia, hybridization is particularly frequent. Large-scale observations for three years at the Dagestan Experimental Station on 1800 pure lines from local barleys comprising a great number of races revealed 0-15% of natural hybrids. From the fact that some of these hybrid forms bred true the author concludes that the whole of the great variety of races in the Dagestan barleys is due to natural crossing.

In 1938 acenaphthene treated seed of a collection of barley varieties including one Indian, naked, hooded Nepal barley and some rather peculiar morphological forms from Abyssinia were sown at the Genetics Institute of the Academy of Sciences of the U.S.S.R. Pure lines drawn from this material included, in the plot of Abyssinian barley var. *copticum*, one plant differing sharply from the rest in its ear, though obviously belonging to this family morphologically so different from all the others. The ear was hooded instead of awned but was two-rowed like the rest. The plant was apparently a natural hybrid from a cross of an Abyssinian plant of var. *copticum* by the Nepal variety, but the F_2 was completely fertile in spite of the rather wide phylogenetic difference between the two parent forms. The F_2 showed a great variety of morphological forms, especially as regards the type of ear. In analysing this F_2 material, which could be grouped into eight classes, differences in the hooding and its relation to the awn, density of the ear and its length and colour were among the distinctive characteristics noted.

In groups 5 and 6 a new type of ears was found differing entirely from either parent; the hoods

were developed only on the middle spikelet, the lateral spikelets having short awns. The new form of ear appears to correspond exactly with the ear in the botanical variety *cornutum* Körn. endemic in South Africa, which suggests that *cornutum* has arisen in nature by hybridization.

Groups 7 and 8 which were six-rowed and awned, exhibited some novel variants with long awns on the middle spikelets and short ones, or no awns at all, on the lateral spikelets. No forms were found with long awns on the lateral spikelets and short or no awns on the central spikelets. Such forms have not yet been found in nature either and the possibility that their absence may be due to factor linkage will be tested in the F_3 .

Crosses of black and white forms gave in the F_2 not only these two colours but also purple eared forms; the ratio for 78 plants harvested was 62 black, 10 white and 6 purple.

The hybrid had a much firmer straw than the maternal plant and the effectiveness of selections, specially made to combine a larger naked grain with firmer straw, will be revealed by further selection in the F_3 and subsequent variety trials.

1223. BRINK, R. A. and

COOPER, D. C.

633.16:575.127.5:633.14:576.354.46

Embryo viability and development of the seed following interspecific hybridization.

Rec. Genet. Soc. America 1943 : No. 12 : 43-45. (Abst.).

An F_1 plant from the cross *Hordeum jubatum* ($n = 14$) x *Secale cereale* ($n = 7$) has been reared after excising the embryo and growing it in culture. The hybrid was sterile forming 5 loosely associated bivalents and 11 univalents at diakinesis. The causes of embryo abortion are discussed.

1224. KRAEVOI, S. JA.

633.16:575.243:537.531:575.114

(Viable plants from hybridization of defective mutants of barley).

Vestnik Gibrizidacii (Hybridization) 1941 : No. 2 : 103-05.

The following two X-ray mutants of the variety 046 of *Hordeum sativum* var. *medicum* Körn, obtained by selection at the Odessa Breeding Station, were crossed: (1) *H. sativum nonaristatum* Kraj., used as the ♂ parent, an undersized, thin-stemmed plant with abundant tillers, semi-sterile and rather weak, and (2) *H. sativum* var. *fistulosum* Kraj., used as the ♀, also defective and undersized and showing 19.09% sterility.

The F_1 plants for this cross were unlike either parent and practically normal and scarcely differed at all from the original variety 046 which they equalled in stem length and productivity, though sterility up to 12.35% was observed. The F_1 was, however, somewhat lacking in uniformity in height, several tillers surpassing *medicum* 046. Nevertheless there was no segregation in the F_2 , all plants being of the 046 type. Some sterility (7.47%) still persisted in the F_2 .

A cytological study of the mutants and hybrids and reciprocal hybridization will be necessary to elucidate this case.

1225. THREN, R.

633.16-2.451.2:576.16:575.127.2:631.521.6

Zur Frage der physiologischen Spezialisierung des Gerstenflugbrandes *Ustilago nuda* (Jensen) Kellerm. et Sw. und der Entstehung neuer Gerstenbrand-Rassen.

(The question of the physiological specialization of loose smut of barley *U. nuda* (Jensen) Kellerm. et Sw. and the origin of new barley smut races).

Phytopath. Z. 1941 : 13 : 539-71.

The chlamydospores of *U. nuda* usually germinate so that nuclear pairing takes place in the promycelial stage. This almost complete elimination of a haploid phase reduces the chance of out-crossing and is correlated with the low degree of variability, the low mutation frequency and the few races of this species.

Only two physiological forms of the fungus are distinguished: race S, from spring barley and race W, from winter barley. No alteration in the character of these types could be obtained by inoculating them into bridging hosts. In general, race S is more virulent than W and a table showing varietal resistance to both races is included, several resistant barley strains being discovered in the material of the German Hindu Kush Expedition.

The differences between *U. nuda*, *U. Hordei*, *U. medians* and *U. Tritici* are discussed. Hybridization between haploid mycelia of *U. nuda* and the other three species was effected but such hybridization is not believed to occur naturally nor is the possibility of new races arising believed to be serious. Attempts to hybridize *U. nuda* and *U. Tritici* in the tissues of either wheat or barley proved abortive.

1226.

633.16-2.7-1.521.6:575

U.S. breeds better barleys for special needs; aphid-resistant strain due for Texas, Oklahoma.

Sth. Seedsman 1944 : 7 : No. 4 : p. 32.

Aphid resistant barley varieties suitable for Texas and Oklahoma are being developed by the Bureau of Plant Industry and the Texas Experiment Station.

MILLETS AND SORGHUM 633.17

1227.

633.17:575(43)

KUBLAN, A.

633.17:582

Aussichten und Möglichkeiten des Hirseanbaus. Ergebnisse der züchterischen Bearbeitung. (**Prospects and possibilities of millet cultivation—Results of breeding operations**).

Forschungsdienst 1943 : 16 : 276-83.

Millet breeding in Germany aims at the production of a green fodder plant suitable for light soils. The German Hindu Kush Expedition has provided a large collection of forms for use in breeding. To promote the re-cultivation of millet in the eastern parts of Germany where it was formerly a domestic plant, early maturing strains must be developed by selection.

Breeding operations were begun by Prof. Heuser (formerly of Landsberg/Warthe) and H. Schleif at the Institute for Plant Culture and Plant Breeding of the Experimental and Research Establishment for Agriculture in Landsberg/W. with both *Panicum miliaceum* (which is described) and *Setaria*.

Good results as regards yield of green fodder and grain are stated to have been obtained and cross-breeding to develop types suitable for the utilization of the grain and also for green fodder was begun.

Heuser's material was ultimately taken over by a Berlin concern (die Maisanbau-Gesellschaft) for development at their seed farm at Maleksberg in Schleswig-Holstein. The resulting strain was ultimately called the Maleksberg millet and has been officially recognized as a pedigree variety. Tiemann and Kaempfer undertook the breeding of *Setaria italica rubra* and another approved pedigree strain has been produced.

Another strain of common millet, but not so tall, has also been successfully bred, in this case more for grain production.

The question of desirability or otherwise of extending the future range of millet cultivation in the so-called "Ostgebiete" (Eastern territories) is touched upon.

Citing Tiemann and Kaempfer on Die Hirsen (The Millets), published in Bd. 70 of the Arbeiten des Reichsnährstandes, on the systematic position of the millets, the writer points to the large and small forms of *Setaria glauca* as wild forms of *Setaria* and *P. germanicum* as a primitive form.

1228. COOPER, D. C. and

BRINK, R. A.

633.17:575.127.5:633.14:581.481

The antipodals as a factor in seed failure following an interspecific mating in the Gramineae.

Rec. Genet. Soc. America 1943 : No. 12 : 45-47. (Abst.).

The embryo abortion in the cross *Hordeum jubatum* x *Secale cereale* may be caused by the failure of the antipodal cells to convey essential nutrients to the endosperm.

FORAGE GRASSES 633.2

1229. PAVLENKO, E. K.

633.2/3:575.257:578.08

(Vegetative hybridization of forage grasses).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 102-03.

The technique and results of grafting clover on lucerne and sainfoin are described and illustrated. The author believes that vegetative hybridization of leguminous forage crops has a future in plant breeding.

1230. COUKOS, C. J.

633.2:581.143.26

Seed dormancy and germination in some native grasses.

J. Amer. Soc. Agron. 1944 : 36 : 337-45.

Varietal differences in the period of seed dormancy have been investigated in the species *Andropogon furcatus* Muhl., *A. scoparius* Michx., *Sorghastrum nutans* (L.) Nash, and *Bouteloua curtipendula* Michx.

1231. SMITH, D. C. 633.2:581.162.3
Pollination and seed formation in grasses.
 J. Agric. Res. 1944 : 68 : 79-95.

Pollination studies in a large number of grass species grown under field and greenhouse conditions are reported (for further details see Herbage Abstracts, Vol. 14, Abst. 1133).

1232. CLARK, J. W. 633.2:581.162.3:578.08
The effect of some environmental influences in bulk hybridization of grass.

J. Amer. Soc. Agron. 1944 : 36 : 132-40.

Hot water treatment was applied to the inflorescences of *Bromus inermis*, *Agropyron cristatum* and *Agropyron Smithii* in an attempt to emasculate the florets without damaging the ovaries. Treatment at 47° C. for 5 mins. just prior to anthesis was most effective and treatments at mid-day were less injurious to the plant than treatment either in the early morning or late afternoon. However, a temperature of 45° C. was as effective at 6 a.m. as 47° C. at noon. Various methods of bulk pollination inside paper bags were tried, but none was so effective as leaving the inflorescence continuously exposed to natural pollination. The temperature inside the bags was found to be 2° C. higher than outside but the author does not consider this to be the sole factor reducing fertilization inside the bags.

1233. MCALISTER, D. F. 633.2-2.112-1.521.6
Determination of soil drought resistance in grass seedlings.
 J. Amer. Soc. Agron. 1944 : 36 : 324-36.

A greenhouse technique has been elaborated for assessing the drought resisting properties of grasses. Varietal differences have been investigated in the following species: *Alopecurus pratensis*, *Arrhenatherum elatius*, *Dactylis glomerata*, *Festuca elatior*, *Agropyron trachycaulum*, *A. cristatum*, *A. sibericum*, *Elymus glaucus*, *E. junceus*, *Bromus inermis*. (For further information see Herbage Abstracts, Vol. 14, Abst. 1677).

1234. JULÉN, G. 633.24:575.42(48.5)
 Redogörelse för de senaste årens försök med timotej. (**Report on the experiments of the last few years with timothy.**)
 Sverig. Utsädesfören. Tidskr. 1943 : 53 : 336-40.

The performance of improved strains of timothy including the new strains Bore II and Sv 0812 is discussed. The first is a selection from Bore I and has given better results than Bore I or Gloria. Sv 0812, produced at Svalöf, is interesting as having been derived from a plant self-fertilized for two generations. It has surpassed all its competitors in tests at various places. It may have great possibilities as a universal variety for Svealand, Götaland and the southern half of Norrland. Its one weakness appears to be susceptibility to *Sclerotinia borealis*; this it displayed in its only trial in Luleå. (For further information see Herbage Abstracts, Vol. 14, Abst. 1455).

1235. KNOWLES, P. F. 633.262:575.127.2:576.312.35
Interspecific hybridizations of *Bromus*.
 Genetics 1944 : 29 : 128-40.

The author attempted to cross *Bromus mollis* with 13 other species of *Bromus*, success being obtained only with *B. racemosus*, *B. arenarius*, *B. rubens*, *B. madritensis* and *B. carinatus*. The chromosome numbers of the following species are reported: *B. arenarius* ($2n = 28$), *B. racemosus* ($2n = 28$) and *B. Trinii* ($2n = 42$).

The phylogenetic relationships of the various species and sections within the genus are discussed.

1236. MYERS, W. M. 633.263:576.356.5
Cytological studies of a triploid perennial ryegrass and its progeny.
 J. Hered. 1944 : 35 : 17-23.

The course of meiosis in a triploid plant of *Lolium perenne* is described. Non-homologous chromosome association appears to occur in prophase.

1237. LOVE, R. M. 633.285:576.356.52
A haploid *Stipa cernua*.
 Rec. Genet. Soc. America 1943 : No. 12 : p. 51. (Abst.).

A naturally occurring haploid plant of *S. cernua* is described. It is vigorous but sterile, and the following meiotic configurations were observed: 35_n , $1_n + 33$, and $2_n + 31$.

1238. WENGER, L. E. 633.288:575.42
Buffalo grass.
 Bull. Kans. Agric. Exp. Sta. 1943 : No. 321 : Pp. 78.

Buffalo grass [*Buchloe dactyloides* (Nutt.) Engelm.] is highly variable and is being selected for seed productivity, yield, quality and disease resistance.

LEGUMINOUS FORAGE PLANTS 633.3

1239. TORSSELL, R. 633.31:575:633.31-1.521.5(48.5)
 Odling, förädling och fröodling av blåluzern. (**Cultivation, improvement and seed production of blue lucerne**).
 Sverig. Utsädesfören. Tidskr. 1943 : 53 : 275-84.

This lecture at the meeting of the Swedish Seed Association in March 1943 included a short analysis of the methods used at Ultuna in breeding lucerne and records of some of the successful strains obtained there up to the present. The importance of suitable methods of seed production to maintain valuable strains is pointed out.

Degeneration due to inbreeding in the strains is discussed.

1240. ATWOOD, S. S. 633.322:576.356.5:581.04
Colchicine-induced polyploids in white clover.
 J. Amer. Soc. Agron. 1944 : 36 : 173-74.

Polyploids were produced from Kentish white clover by treatment with colchicine. A 0.4% solution dropped at hourly intervals on to the plumule at a stage when the unifoliate leaf was unfolding was most effective. The 64-chromosome plants were slower growing than the 32-chromosome plants and it is suggested that as available evidence indicates the 32-chromosome clover to be an allotetraploid, doubling to 64 chromosomes may have exceeded the optimum number for the species.

241. JOHNSON, I. J. and SASS, J. E. 633.366:576.356.5:581.04:581.162.5
Self- and cross-fertility relationships and cytology of autotetraploid sweet clover, *Melilotus alba*.
 J. Amer. Soc. Agron. 1944 : 36 : 214-27.

Autotetraploid plants of *Melilotus alba* were produced by submerging the cotyledons and the terminal bud in 0.05% colchicine solution for six hours.

Tetraploid plants were larger than the diploids in respect of the vegetative and floral organs, leaf and root cells, pollen grains and somatic nuclei. Chromosome lagging at first meiotic metaphase ranged from complete absence of irregularity to markedly irregular distribution. Univalent, bivalent, quadrivalent and rarely trivalent associations were observed. Tetraploid plants varied markedly in self-fertility and significant differences were obtained in cross-fertility and self-fertility in 4 out of 32 matings, differences which could not be explained on the basis of a lack of fertile pollen or of normal egg cells. The F_1 generation plants, from crosses between parents differing in self-fertility, showed significant variability in self-fertility.

1242. GETTYS, R. E. and JOHNSON, I. J. 633.366:581.162.5:575.11
The nature and inheritance of sterility in sweet clover, *Melilotus officinalis* Lam.
 J. Amer. Soc. Agron. 1944 : 36 : 228-37.

Two plants of *Melilotus officinalis* which proved to be self-sterile and cross-fertile under glass-house conditions gave an F_1 progeny that was also almost completely self-incompatible. The seasonal effect on percentage self-fertility of the two self-incompatible plants was noted. Whilst one showed no significant difference in pod setting the other varied considerably.

The results obtained by backcrossing the F_1 progeny of the two self-sterile lines to the parents indicate that the sterility is of the oppositional factor type. By mating a self-fertile line with a self-sterile plant both F_1 and F_2 generations were found to be self-fertile. This suggests that the self-fertility allele is dominant to the self-sterility allele.

1243.

WINKLER, H.

633.367:575:576.16(48.5)

633.367(48.5)

Gul sötlupin—en ny, rikgivande foderbaljväxt för lättare jordar. (**Yellow sweet lupin—a new productive fodder legume for lighter soils**).

Svenska Vall- MosskFören. Kvart. 1943 : 5 : 393–412.

After an outline of the history, origin and botanical features of various species of *Lupinus*, an account is given of the work that has been done in Germany on bitter and sweet lupins (already reviewed in "Plant Breeding Abstracts").

Work in Sweden on sweet lupin is then dealt with from the standpoint of cultivation and utilization.

1244.

EASTWOOD, A.

633.367:582:001.4(79.4)

New species and varieties of *Lupinus*.

Leaflet. West Bot. 1942 : 3 : 169–75.

The following new American species of *Lupinus* are described: *L. caesius*, *L. klamathensis*, *L. Kuschei*, *L. ochroleucus*, *L. oreocharis*, *L. pasadenensis*, *L. pulcher*, *L. rimae*, *L. sublanatus*, and *L. wenatchensis*.

ROOTS AND TUBERS 633.4

1245.

DÍAZ DE MENDIVIL, J. M.

633.491:575(46)

La mejora del cultivo de la patata en España. (**The improvement of potato cultivation in Spain**).

Agricultura, Madrid 1944 : 13 : 55–68.

JORDÁN DE URRIES, F.

Obtención de nuevas variedades de patata. (**Production of new varieties of potato**).

Ibid. 1944 : 13 : 72–76.

The February number of the journal Agricultura is devoted in its entirety to a series of articles on the potato in Spain. In the first of the two under review, an account is given of the introduction and development of potato cultivation in Spain. In 1933 the Estación de Mejora del Cultivo de la Patata [Station for the improvement of potato cultivation] was founded in Alava, at an altitude of 1000 metres, with three substations in adjacent areas. The first four years were spent in selection and examination of the local potatoes and of a number of imported varieties. In this way a stock of selected material for seed purposes was produced and a special service for maintaining and distributing it has been instituted. A list is given of the varieties of which selected seed is available.

The second article deals with the methods of improvement by genetical means. The possibility of effecting improvement by tuber selection is illustrated by the production of the early maturing Eerstling in Holland by selection from Duke of York. The use of hybridization is described and illustrated by reference to modern breeding work for the production of hybrids resistant to blight, Colorado beetle and other pests and diseases. Promising imported varieties have been crossed with existing Spanish varieties and among themselves and it is hoped that improved Spanish varieties will be available shortly.

1246.

KAPENGA, C.

633.491:575.127.2

De mogelijkheid van de kruising *Solanum tuberosum* ♀ x *S. chacoense* ♂.

(**The possibility of the cross *S. tuberosum* ♀ x *S. chacoense* ♂**).

Genetica 1943 : 23 : 537–38.

Referring to Stelzner's successful *S. tuberosum* x *S. chacoense* cross in 1941 (see "Plant Breeding Abstracts", Vol. XIV, Abst. 900), the writer records his own success in the same year, the pistillate parents in his case being Epicure and Roode Star [Red Star]. An illustration of the F_1 hybrid is shown.

1247.

LIVERMORE, J. R.

633.491:575.247:582:001.4

Naming selections from established varieties.

Amer. Potato J. 1944 : 21 : 72–74.

This article includes a short discussion on the nomenclature of potato varieties and describes the origin of Toanco No. 4 and Pioneer Rural, both of which arose as bud sports from Russet Rural.

1248. KARIKKA, K. J., DUDGEON, L. T. and HAUCK, H. M. 633.491:577.16(74.7)
Influence of variety, location, fertilizer, and storage on the ascorbic acid content of potatoes grown in New York State.
 J. Agric. Res. 1944 : 68 : 49-63.

Varietal differences in ascorbic acid content were observed between certain domestic potatoes when analysed in three different seasons. Katahdin and Houma gave high values in all three years whilst the values for Chippewa were consistently low. Irish Cobbler, Warba, Sebago, Earlane and Green Mountain were also tested, and gave intermediate or less consistent results.

1249. RATERA, E. L. 633.491:581.162
 Observaciones sobre la biología floral de *Solanum chacoense* Bitter. (**Observations on the floral biology of *Solanum chacoense* Bitter**).
 Rev. Fac. Agron. B. Aires 1943 : 10 : 87-93.

Solanum chacoense Bitt. is shown to be capable of self-pollination under conditions at Buenos Aires. According to the author's observations the flowers are practically homogamous.
 J. G. H.

1250. MORTON, C. V. 633.491:582(8)
Taxonomic studies of tropical American plants. Some South American species of *Solanum*.
 Contr. U.S. Nat. Herb. 1944 : 29 : 41-72.

This article includes notes on the following sections of *Solanum*: *Anarrichomenum*, *Anthoresis*, *Campanulisolanium*, *Dulcamara*, *Herpysticum*, *Indubitaria*, *Leiodendron* and *Lycianthes*. A synopsis of the species of *Lycianthes* has been compiled.

1251. MÜLLER, K. O. 633.491-2.411.4-1.521.6:575(43)
 Die Erfolge der Züchtung phytophthoraresistenter Kartoffelsorten. (**Results of breeding *Phytophthora* resistant potato varieties**).
 NachrBl. Ges. dtsh. PflSchDienst 1941 : 21 : p. 17.
 [From Züchter 1941 : 13 : 299-300.]

Three *Phytophthora* resistant strains with superior yields of tubers and starch have been included in the official variety list in Germany under the names Erika (Ragis), Frühnudel (Knehden) and Robusta (v. Pfelten). The pedigrees of all three include forms released some years ago by the Biological Institute (Biologische Reichsanstalt) for use in breeding resistant varieties. The new varieties are resistant only to Biotype A. The problem of developing potato varieties resistant to all known forms of the fungus still remains to be solved.

1252. SCHLUMBERGER, O. 633.491-2.412.5-1.521.6(43)
 Die Zuverlässigkeit der Kartoffelkrebs-Prüfungen. (**The reliability of potato wart trials**).
 Forschungsdienst 1943 : 16 : 215-20.

The author is concerned to show, firstly, that the official testing centres in Germany were not taken by surprise when biological races of *Synchytrium endobioticum* (Schilb.) Perc. were discovered, and secondly that, in spite of the occurrence of new, highly virulent races in Thuringia and Bohemia, the existing system of variety trials for resistance to wart disease provide entirely satisfactory guarantees from the practical standpoint. The way in which the official trials are organized is recorded. Kohler's work is referred to.

1253. MUJICA, R. F. 633.491-2.484-1.521.6
 Patogenicidad de algunas cepas del *Verticillium albo-atrum* Rei. y. Berth. (**Pathogenicity of certain strains of *V. albo-atrum* Rei. et Berth**).
 Bol. Sanid Veg., Chile 1941 : 1 : No. 2 : 7-20.

The existence of different races differing in their virulence and host plants was established. The potato variety Irish Cobbler was susceptible but Katahdin proved immune.

1254. MOLODOŽNIKOV, M. M. 633.492(47)
(Sweet potato. A valuable industrial, fodder and technological crop).
 Vsesojuznaja Selekcionnaja Stancija Vlažno-Subtropičeskikh Kul'tur (State
 Breeding Station for Crops of the Humid Sub-tropics) Suhumi 1943 : Pp. 46.

Efforts to extend the cultivation of the sweet potato in the U.S.S.R. have been intensified since the war. The botanical characteristics of the plant are described. The main factor determining the amount and earliness of the yield is the temperature. The plant will grow in many arid areas where few other crops survive.

Data are given showing the high nutritive value of the plant and the advantages of its cultivation both as stock feed and for human consumption. Flour prepared from it has been used with success in making bread and confectionery and the various other uses that the plant has been put to are described. Information is given also on the cultural requirements and the various means of utilizing the plant.

Descriptions are given of the five chief varieties grown in the U.S.S.R. Many promising varieties have been selected from segregates arising from some seed obtained from Formosa. The best of these arose from seedling F-85, which has now been named Pervenec S.S.S.R. [U.S.S.R. Firstborn], and has maintained its first place during the last 10 years in respect of uniformity and compact growth of tubers, table quality (semi-sweet), low fibre content and high yield. Only one variety has excelled it in yield but is more fibrous and useful only for stock feed; it has been named Rekordnyĭ [Record]. The variety Lučšii iz Vseh [Best of All] is the best for boiling (steaming) as it has regular spherical tubers of excellent flavour. Krasnyĭ Suhumskii [Suhumi Red] is recommended as a sweet variety and the variety Kartofel'nyĭ [Potato] is of interest in that even after curing the tubers do not become sweet. A large number of other Soviet and imported varieties are under observation.

1255. BEASLEY, J. O. and FIBRES 633.5
 BROWN, M. S. 633.51:576.356.4:575.127.2
**The production of plants having an extra pair of chromosomes from
 species hybrids of cotton.**

Rec. Genet. Soc. America 1943 : No. 12 : p. 43. (Abst.).

Additional chromosome pairs have been added to the chromosome complements of American Upland cottons by crossing this tetraploid type with diploid species, duplicating the chromosome sets of the triploid hybrids by means of colchicine, and subsequent repeated back-crossing to Upland cotton. In this way, 54-chromosome strains have been obtained containing in one case, two chromosomes from *G. arboreum* var. Nanking and in the other, a pair from *G. Harknessii*. The meiotic behaviour of these new forms is briefly described.

1256. 633.51:581.6:575.061.6

Coloured cottons grow in Uzbekistan.

Soviet War News 1944 : No. 855 : p. 3.

It is stated that cottons with brown lint giving unfadable yarns have been produced by selection and that their quality is well up to standard. A number of shades of green have also been produced.

1257. GRANHALL, I. 633.52:575(48.5)
 Svalöfs Atlaslin. Ny sort av oljelin för Skåne och angränsande områden samt
 Gotland. (Svalöf Atlas flax—A new variety of linseed for Scania and
 neighbouring districts and Gotland).

Sverig. Utsädesfören. Tidskr. 1943 : 53 : 403-04.

The good points of the Svalöfs Renodlade (Svalöf Purebred), a selection probably derived from an Argentine flax, are mentioned. The variety Atlas, intended for Scania primarily and adjacent districts, also Gotland, has surpassed Svalöfs Renodlade in yield of seed by 5.9% with an average of 1430 kg. per ha. in trials from 1940-43. It is a line selection from seed belonging to K. A. Karmark, Linköping, who with I. Wälsted of the Östgöta Station conducted the first selection. In an experiment at Alnarp, Atlas gave 2700 kg. per ha. It usually ripens at the same time as Svalöfs Renodlade or 2-3 days later. It is a typical linseed flax with short branched straw and large and abundant capsules with unusually large seeds. The 1000-corn weight is 9-10 gm. as compared with 6-7 gm. for Svalöf Renodlade, while its oil content was 2% more than that of its competitors and about 5% higher than from seed of fibre flax. The new variety stands high doses of nitrogen without lodging, though on poor soil there is the risk that the stems may grow too short for harvesting easily with a self-binder.

1258. ROGACH, A. R.

633.52:575.127.2

(Interspecific hybrids in *Linum*).

Vestnik Gibrizdizacii (Hybridization) 1941 : No. 2 : 84-88.

Some of the wild perennial species of *Linum* possess many valuable characters such as group immunity to fungous diseases, drought resistance, winter hardiness, tolerance of unfavourable conditions, etc., and produce a large number of stems per plant. The attempts of earlier investigators to produce interspecific hybrids have mostly failed.

The author's experiments have shown that heterostyly must be taken into account when choosing the individuals to be used in crossing. When the tetraploids *L. sibiricum* K-4580 and *L. perenne* K-2918 were crossed with *L. alpinum*, *L. narbonense* and *L. austriacum*, seed sets varying from 0.97% to 30% were obtained. The hybrids, grown in 1938, were perennial, flowered late and were sterile and most of them were destroyed by the winter. Cytological examination of the hybrids that survived revealed a somatic chromosome number of 27 in the hybrids *L. sibiricum* K-4580 ($2n = 36$) x *L. narbonense* ($2n = 18$), *L. alpinum* K-116 ($2n = 18$) x *L. perenne* K-2918 ($2n = 36$) and *L. perenne* K-2918 ($2n = 36$) x *L. perenne* K-58 ($2n = 18$). All were sterile and only 0.5-5% of the capsules contained one seed or occasionally two. All except *L. sibiricum* x *L. narbonense* exceeded the taller parent in height.

No seed was obtained by pollinating the hybrids with cultivated flax pollen but the attempts are to be continued.

1259. LEVAN, A.

633.52:575.243:575.11.061.633:537.531

Experimentally induced chlorophyll mutants in flax.

Hereditas, Lund 1944 : 30 : 225-30.

Diploid and tetraploid flax varieties were treated with X-irradiation in order to obtain induced mutations. Three families segregating for chlorophyll-deficient mutants were obtained from the diploid flax but none from the tetraploids. Mutants 1 and 2 segregated according to a monomeric scheme but the behaviour of mutant 3 could not be explained so simply. Various hypotheses to account for the mode of segregation observed are considered.

1260. RAY, C. R.

633.52:576.312.35

Cytological studies on the flax genus, *Linum*.

Amer. J. Bot. 1944 : 31 : 241-48.

Chromosome numbers, shapes and sizes have been investigated for 30 species of *Linum* and in 28 varieties of *L. usitatissimum* L. Seven types of configuration are recognized in the genus: (a) $n = 8$, medium size chromosomes, (b) $n = 8$, large chromosomes, (c) $n = 9$, medium chromosomes, (d) $n = 10$, medium, (e) $n = 14$, large, (f) $n = 15$, small, and (g) $n = 15$, large. All the varieties of *L. usitatissimum* had 15 haploid chromosomes.

1261. GRANICK, E. B.

633.526.2:576.356.5:582

A karyosystematic study of the genus *Agave*.

Amer. J. Bot. 1944 : 31 : 383-98.

A cytological investigation of 31 species of *Agave* has demonstrated the existence of a polyploid series built from a basic chromosome number of 30, $2n$, $3n$, $4n$, $5n$, and $6n$ complements having been found. The diploid species have 10 large chromosomes and 50 small chromosomes, the former being distributed around the periphery of the metaphase plates.

Polyploidy is correlated both with vegetative habit and geographical distribution. The higher polyploids tend to be more fleshy and spinous, or more fibrous than the diploids, and while the diploids are most confined to Mexico the polyploids range northward to Utah and Nevada.

Both allopolyploidy and autopolyploidy appear to have occurred and crossing and subsequent segregation of hybrid swarms are frequent. These facts lead to serious difficulties in taxonomic investigations of the genus.

The unusual character of the *Yucca-Agave* karyotype raises the question of its phylogenetic origin. According to Hutchinson, the Yuccaceae and Agaveae are best considered as tribes of a new family, the Agavaceae. The association of these two tribes together with the Polyanthaeae is confirmed by cytological evidence, excluding however the genus *Dasylyron*. No cytological evidence was found to support the inclusion of the Dracaeneae and the Nolineae in the Agavaceae. More remote phylogenetical affinities are believed to connect the Agavaceae with the genus *Hosta* of the Liliaceae, and with certain members of the Helobiae.

1262. CROSS, W. E. 633.61:575(82)
 Memoria anual del año 1942. (**Annual report for 1942**).
 Rev. Industr. Agric. Tucumán 1943 : 33 : 33-137.

Sugar cane smut has now appeared in all parts of the Tucumán Province and while P.O.J. 36 and its mutants have proved highly susceptible to it, many of the other varieties are resistant. A list of the resistant and of the susceptible varieties is given. Tests for smut resistance must now be made on all new seedlings selected by the station. Seedlings Nos 379, 472, 1111, 1376, 1400, 1406, 2611, 2622, 2634, 2645, 2657, 2680, 2683, 2701 and 2705 have continued to give promising results and among the newer seedlings, Nos 3342, 3496, 3663, 4398, 4493, 4535, 4600, 4617, 4624, 4832, 4915, 5122, and 5142 have shown the most promise.

1263. BALCH, R. T. and
 BROEG, C. B. 633.61:581.6
Sugarcane wax studies, 1942-3.
 Sug. Bull. N.O. 1944 : 22 : 106-09, 117-19, 123-27.

Varietal differences in the wax content of Louisiana sugar cane are reported.

1264. SCHLEHUBER, A. M. 633.62:575-181.13
Atypic dwarfing in sorgo.
 J. Amer. Soc. Agron. 1944 : 36 : 361-64.

Several dwarf types have appeared in inbred lines of sweet sorghum. The causes of this abnormality are obscure and the modes of inheritance difficult to determine owing to the low seed production.

1265. ADAMENKO, F. I. *et al.* 633.63(47)
(The cultivation of sugar beet for seed in irrigated districts of the Kirgiz and Kazah S.S.R.'s).
 Vsesojuznyi Naučno-issledovatel'skii Institut Saharnoi Promyšlennosti [VNIS] (State Sugar Beet Research Institute) Frunze 1942 : Pp. 105.

This monograph has been published mainly for use as a handbook by all those responsible for the organization and management of sugar beet plantations in eastern regions of the U.S.S.R. where, before the war, such crops were not raised. In its compilation the authors utilized all the experimental data and results of field and commercial tests that were amassed in the U.S.S.R. by the state and local research bodies and by the state and collective farmers growing sugar beet as an industrial crop. It deals briefly with the origin and biology of sugar beet; with the whole consecutive series of agronomical operations from the pre-sowing treatment of the soil to the harvesting of the seed in greater or lesser detail; and also briefly with the principal diseases and insect pests of sugar beet.

1266. HERMAN, I. V. 633.63:575.12:633.416:581.162.32
(The extent of natural crossing in sugar beet).
 Vestnik Gibriziacii (Hybridization) 1941 : No. 2 : p. 102.

A group of plots each consisting of 400 genotypically uniform sugar beets with entirely unpigmented roots were surrounded by four rows of fodder beets, the spacing being 71 x 71 cm. and the times of flowering of the 2 crops being suitably adjusted. Ultimately the number of sugar x fodder beet hybrids recorded in the progenies surrounded by the mangels averaged 86.4% with a range of variation of 67.3-99%. Analysis showed the greater part of the seed set was due to cross-pollination. It would therefore be important to determine the distance necessary for spatial isolation.

1267. LEVAN, A. 633.63:576.356.5
On the normal occurrence of chromosome doublings in second-year root tips of sugar beets.
 Hereditas, Lund 1944 : 30 : 161-64.

The incidence of somatic polyploidy in sugar beet roots is described. In one case, a 16-ploid sector was observed.

1268. 633.63:576.356.5:581.6
 LEVAN, A. 633.416:576.356.5:581.6
 Jämförande undersökning över utvecklingen av diploid och tetraploid sockerbeta och foderbeta. (**Comparative investigation on the development of diploid and tetraploid sugar beet and fodder beet**).
 Sverig. Utsädesfören. Tidskr. 1943 : 53 : 215-38.

In these experiments, begun in 1942 at Svalöf, the material consisted of diploid and tetraploid

sugar beet and mangels: the tetraploid sugar beets were represented by C_4 seed, i.e. 4th generation seed after chromosome reduplication, derived from a cross of about 10 Hilleshög plants with the double chromosome number; the tetraploid fodder beets were C_2 , i.e. 2nd generation after chromosome reduplication from Barres medium long.

The following results were obtained. The root weight of the tetraploids was lower as compared with the diploids. The water content of the roots of the diploid and tetraploid forms differed little, but in the tops it was usually higher in the polyploid. In the tetraploids the roots were shorter, forking was rarer and leaves per plant were fewer. In sugar beets the diploids generally had higher sugar content and refraction values but the reverse was the case in the mangels, in which the tetraploids were smaller than the diploids.

Nitrogen content was higher in the tetraploid roots, which might be an advantage in mangels but not in sugar beets.

Carotene content differed little in diploids and tetraploids. The latter were more susceptible to root rot and *Ramularia* attack.

It would appear that the tetraploid mangels and sugar beets do not offer any practical advantages so far, but it remains to be seen whether improvement can be attained by the available methods. Hilleshög Institute is conducting extensive work on the production of large supplies of tetraploid sugar beets and the Chromosome Division is devoting much of its time to this crop.

1269. LEVAN, A. and 633.63:581.143.26:576.356.5
OLSON, P. A. 633.416:581.143.26:576.356.5

On the decreased tendency to bolting in tetraploids of mangels and sugar beets.

Hereditas, Lund 1944 : 30 : 253-54. (Abst.).

Tetraploid plants of Vilmorin sugar beet and Barres mangel showed a lesser tendency to bolt than the corresponding diploids. The difference between diploid and tetraploid strains of Hilleshög was hardly significant.

1270. ENGELKE. 633.63:581.6(43.71+43.72)
Der Zuckerrübenbau in Böhmen und Mähren. (Sugar beet cultivation in
Bohemia and Moravia).
Zuckerrübenbau 1943 : 24 : 61-70.

This article records the results of field tests on the yield and sugar content of the varieties grown in Bohemia and Moravia.

1271. BESSER, A. A. 633.64(47)
(**The maple sugar industry**).
Priroda (Nature) 1943 : No. 3 : 46-57.

This is an account of the maple sugar industry which is in the U.S.S.R. still in its embryonic stage. Of the few species of maple occurring in the country the following are of interest as an actual and potential source of maple syrup: *Acer platanoides*, *A. campestre*, *A. Pseudoplatanus*, *A. velutinum*, *A. lactum*, *A. Trautvetteri*, *A. mandshuricum*, *A. Mono* and *A. ukurunduensis*.

STIMULANTS 633.7

1272. *TERNOWSKY, M. F. 633.71:575.127.2
(**The role of wild growing *Nicotiana* species in tobacco breeding**).
Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 61-66.

N. glutinosa is resistant to mildew and to mosaic but its hybrids with *N. Tabacum* are sterile and very inferior in quality. By growing large numbers of hybrids a certain number of fertile amphidiploids were produced. These, and also the first back-cross of them on to *N. Tabacum*, were immune to both mosaic and mildew. The fertile hybrids of *N. glutinosa* x Dubec bred true for this immunity for a number of generations, with the exception of about 0.5% of susceptible plants which segregated. The hybrid (*N. glutinosa* x Dubec) x Dubec was also immune but segregated in the second generation both for immunity and other characters, a number of deformed and abnormal plants being produced. A small number of plants of the tobacco type also appeared. The proportion of immune plants varied from 44 to 69.6% and from 22 to 37% in the back-cross. The third back-cross generation showed much greater resemblances to tobacco and the proportion of monohybrid segregations was greater; the actual proportion

* An extended abstract of this paper is on file at the Bureau.

differed in progenies from different amphidiploids. Families containing 12–14%, 22–25%, 50–54% and 95–98% mosaic immune plants were found; some of these families did not breed true even in the eighth generation. Some families were obtained however which bred true for immunity up to the eighth generation and in all other respects resembled the parent Dubec 44/39, sometimes varying in time of maturity, height and certain other characters.

Similar experiments, though on a somewhat smaller scale, were made with mildew resistance and constant resistant forms of the Dubec type were obtained.

Many of the resistant hybrids proved inferior in aroma, and in the early generations showed definite characteristics derived from the wild parent. However, from the fourth and fifth generation on, some forms appeared which were in no way inferior to Dubec 44 in quality and a comparison of immune and susceptible plants from different back-crosses showed no correlation between immunity and quality; in fact 6 out of the 16 lines tested excelled Dubec in flavour. By crossing an F_6 plant with Tyk-Kulak a form of Tyk-Kulak with Dubec flavour was produced. Even after two successive crosses on to Trebizond 1272 the Dubec aroma was maintained.

The fertile hybrids and their back-crosses tended to be below the Dubec type in yield and vigour but in the later back-cross generations immune forms exceeding Dubec by 14–19% in yield appeared. Although the work on mosaic resistance was only started in 1936, one immune form was included in the state variety trials in 1940 and by crossing with the standard varieties a number of other promising immune commercial forms have been produced. These are described very briefly.

A number of hybrids have also been produced which combine immunity to both mildew and mosaic and are equal to Dubec 44 in yield, quality and morphological features. In view of the extreme value of these immune hybrids for breeding work, material of them has been sent to a number of breeding stations in different parts of the U.S.S.R.

N. glauca crosses well with *N. Tabacum* and the hybrids transgress the tobacco parent in size and vigour. They are sterile but a number of fertile polyploids have been obtained, some amphidiploid and some sesquidiploid.

Resistance to mottling virus was recessive, the F_1 *N. Tabacum* x *N. glauca*, the amphidiploid *N. ditagla* and the $2n = 60$ sesquidiploid all being susceptible. A number of resistant hybrids of the tobacco type have been selected from the back-cross hybrids and the F_2 sesquidiploid x *N. Tabacum*.

Studies have been made on the inheritance of anabasine in these hybrids, since there is a definite shortage of anabasine sulphate for insecticidal purposes resulting from the gradual disappearance of the wild populations of *Anabasis aphylla* in Central Asia. In the sterile F_1 hybrids *N. Tabacum* x *N. glauca* and *N. rustica* x *N. glauca* nicotine was entirely absent, its place being taken by anabasine. The same was true in the fertile amphidiploids and in the back-crosses to *N. Tabacum* and *N. rustica*. Moreover, the content of anabasine in these hybrids greatly exceeded that in *N. glauca* itself, where it never exceeded 0.86%. Some of the hybrids contained twice that amount. Topped plants of *N. dirugla* (*N. rustica* x *N. glauca*) contained up to 8% of anabasine. The anabasine was transmitted to progeny of *N. ditagla* x *N. Tabacum* up to the 5th and 6th generations and it would appear quite possible therefore to breed races of tobacco that contain anabasine in place of nicotine. The same applies, probably with greater force, to *N. rustica*. The perennial habit of *N. glauca* is dominant in the F_1 *N. Tabacum* x *N. glauca*, and in the amphidiploid and sesquidiploids. Plants that survived the winter in Sukhum have been obtained from later generations of the $2n = 60$ sesquidiploid.

In the later generations of the hybrids with *N. glauca*, forms exceeding the Dubec 44 parent by 20–40% in yield have been isolated.

The F_1 generation and the first fertile generation were very inferior in quality but plants of perfectly satisfactory quality were selected in the later generations and one of them, referred to as Dubec MTZ, was included in the competitive variety trials in the Crimea in 1939, where it outyielded the standard Dubec 44 by 27%, gave a higher percentage of commercial grades and excelled Dubec 44 very materially in flavour.

N. silvestris crosses with *N. Tabacum* most successfully when used as pollen parent and the hybrids are more vigorous than either parent. They are low in fertility, and even back-crosses are difficult to make. At meiosis all twelve *N. silvestris* chromosomes pair with twelve of the *N. Tabacum* chromosomes, leaving twelve univalents. Amphidiploids and sesquidiploids having two tobacco genomes and one *N. silvestris* genome are fully fertile. The hybrids with *N. silvestris* are, like the *N. silvestris* parent, low in nitrogen content and when grown in highly nitrogenous

soils are much superior to the common tobaccos in quality. The same is true of the hybrid *N. triplex*, obtained by pollinating Dubec 44 by the F_1 *N. silvestris* x *N. tomentosiformis*. The first amphidiploid was obtained from the sterile F_1 Dubec x *N. silvestris* by the heat shock treatment. The amphidiploid was not constant in inheritance in respect of morphological features, vigour, fertility and quality and could not therefore be used direct; the most promising way of utilizing it was by crossing it with *N. Tabacum* and selecting among the hybrids. Promising hybrids were also obtained by using the hybrid *N. digluta* x *N. silvestris*. Family 1153 was especially distinguished by its extremely delicate flavour, numerous rounded leaves and white flowers. The complex hybrid *N. digluta* x the trigenome hybrid (Persichan x *N. silvestris*) has given rise to some promising hybrids in the fifth generation. Families 1161 and 1162 were much more delicate in flavour and more aromatic than the standard varieties and are regarded as highly promising. Pollination of Samsun 57 by the hybrid *N. silvestris* x *N. tomentosiformis* has also given rise to some extremely delicately flavoured hybrids, some of which are also very vigorous in growth and resistant to mildew. The only reason that none of these hybrids has yet been released is that they are not resistant to mosaic and they are to be further crossed with mosaic immune forms with the object of overcoming this defect too.

The cross *N. Tabacum* x *N. tomentosiformis* is successful but no seed has been obtained from the reciprocal. The F_1 plants are extremely luxuriant, mainly resembling *N. Tabacum*, but are self-sterile. A few seeds are obtained by open pollination and back-crossing with the parent species. At meiosis $12_{II} + 12_I$ are regularly observed. The hybrids are resistant to a number of races of mildew. Fertile polyploids have been obtained from the combination *N. Tabacum* x (*N. silvestris* x *N. tomentosiformis*).

The valuable properties of disease resistance found in *N. alata* and *N. Sanderae* are difficult to utilize because of the very low fertility of crosses of these species with *N. Tabacum* and of the hybrids.

1273. PRAKKEN, R.

633.71:576.356.52

A spontaneous haploid of *Nicotiana Tabacum*.

Genetica 1942 : 23 : 63-76.

The cytology of a spontaneous haploid of *N. Tabacum* is described. Up to two bivalents may be produced, also occasional restitution nuclei. The significance of these results for the question of the presumed allopolyploid origin of the species is discussed.

1274. HONING, J. A.

633.71:581.142:581.035

Types of *Nicotiana Tabacum*, grown in the Netherlands East-Indies, in subsequent generations partly constant and partly variable as to the need of light for germination.

Genetica 1942 : 23 : 1-21.

Strains of tobacco requiring light for germination have been found in Sumatra, Bali, Lombok and Borneo; light indifferent strains occur in Java, Borneo and Celebes. Some lines with a variable reaction have also been examined. Drying the seeds over lime promotes germination in the variety Hatano but is injurious to other types. Air dried seeds behave differently and no evidence of cytoplasmically determined response could be found. *Nicotiana texana* also comprises light demanding and light indifferent strains.

1275. TEDIN, O.,

PETTERSSON, G. and

LINDBERG, J. E.

633.71:581.6:575:576.16(48.5)

Erfarenheter av och försök med odling av nikotin stark tobak i Skåne 1942. (Experiences and experiments with the cultivation of tobacco of high nicotine content in Scania in 1942).

Sverig. Utsädesfören. Tidskr. 1943 : 53 : 283-98.

Strains of *Nicotiana rustica* grown from seed obtained from different sources in Sweden were studied in the trials run by the Swedish Seed Association at Ugerup and were found to differ greatly in value and to show considerable variation in nicotine content.

Out of 17 strains tested none showed any marked superiority to the one used in the same year in cultivation. All were very heterogeneous including the one used in large scale cultivation. In this strain different morphological types can be detected.

In view of the existing variation, breeding for a combination of high nicotine content with good yield of leaf should give promising results.

The plantations of *N. Tabacum* showed much the highest nicotine content, so that, unless *N. rustica* can be greatly improved, the Swedish strains of *N. Tabacum* seem likely to offer the best prospects for home tobacco production in Sweden.

The possibility of using *N. rustica* as a source of oil was examined.

1276.

633.71-2.484-1.521.6:581.6:575.12

Two new varieties of flue-cured leaf resistant to black root-rot.

Sth. Tob. J. 1942 : 56 : No. 11 : p. 4.

The variety 400 is a high yielding tobacco resistant to black root rot. Variety 401, a selection from 400 x Cash, yields more heavily than 400 and has more body, but its resistance to black root rot is only partial.

1277.

BACHTADZE, K. E.

633.72:575.12(47)

(Hybridization as a method of tea breeding).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 67-83.

The tea grown in the Soviet Union is mainly of the Chinese variety, but the Japanese, Manipur and Ceylon varieties are also grown to a certain extent. The four types are briefly described; the Ceylon variety is a natural hybrid between the subspecies *assamica* and *sinensis*.

Seed size in hybrids was largely dependent on the maternal parent. F_1 hybrid plants at the age of one and a half years were larger than seedlings from open pollination of the same age, and the proportion of vigorous seedlings was 40% in hybrid progenies and only 8% in progenies from open pollination. Hybrids between small leaved forms mostly had small leaves, hybrids of small x large leaved forms segregated into large and small leaved types, with a predominance of medium, while large x large leaved crosses gave progenies consisting mainly of large leaved forms with about 20% of small leaved. Observations on plants of equal ages showed that those of hybrid origin tended to have larger leaves than those from open pollination. In crosses of different maternal parents all pollinated by the same pollen parent the size of leaf was dictated by the female parent. Narrow leaved x narrow leaved crosses gave 67% narrow leaved and 33% normal progeny in the first generation; the second generation, obtained by open pollination, contained 23% narrow leaved and 77% normal. Crosses of narrow leaved x normal gave 28% narrow leaved in F_1 and 15% in F_2 . The narrow leaved forms, which are commercially undesirable, thus gradually disappear in successive generations.

A good quality leaf should be thin, tender and uncurled. Crosses of types with different degrees of curling give intermediate progeny. Rugose leaf surface is correlated with rapid growth and hence a desirable character; it is dominant in inheritance. The short, obtuse leaf tip of the Chinese type is dominant to the long pointed tip of the Indian and the Ceylon hybrid; in crosses between forms with different tips the shorter form is dominant, except when the form with the longer tip is used as seed parent, in which case the hybrids are intermediate. A large number of lateral veins, characteristic of the Indian and Ceylon types, is recessive in inheritance.

The Ceylon hybrid segregates in its progeny, the characters of the Chinese type predominating. Crosses of Chinese x Chinese give all Chinese in the first generation, and the F_2 generation from open pollination contains most Chinese forms with a few Japanese. Crosses of Chinese x Indian or Ceylon give an F_1 with characters of both parents and an F_2 with a predominance of Chinese characters. Crosses of Ceylon x Ceylon give progeny mainly of the Ceylon type but with all gradations between the Indian and the Chinese types. Open pollination of the Ceylon hybrid gave a progeny with 64% Chinese and 36% Ceylon types; when these plants were intercrossed, they produced 32% Chinese and 68% Ceylon types.

The plants of the pronounced Ceylon type (referred to as Indo-Chinese) surpass analogous plants of the Chinese type both in yield and quality. When mature, they have proved perfectly winter-hardy in Georgia, the critical temperature for 1-2 year old plants being -6 to -8°C ; the lethal temperature is -12 to -14°C . Hybrids have been found to be less hardy than seedlings from open pollination, a large proportion of which have resulted from pollination from the hardier Chinese form.

The progenies from artificial hybridization, where both parents are known, contain 20% to 60% of plants of good quality, as opposed to those from open pollination of a good mother race, which give only 15-20% of good segregates. The best types are selected and the best of all are prepared for vegetative multiplication and production of clones.

Wide crossing has been practised with the species *Camellia japonica*, *C. sasanqua* and *C. oleifera*. *C. japonica* is the closest to *C. Thea* Link and has the same chromosome number ($n = 15$).

It flowers in March and April, before the tea flowers have developed, and crosses can be made only in specially favourable years. Crosses with the other two species are easier to make but involve cytological difficulties, since their chromosome number is $n = 30$. All crosses with other species failed when tea was used as seed parent but a certain number succeeded in the reciprocal. From 2500 crosses made during the last few years, 32 seeds have been obtained, very few of which were normal in appearance. The removal of all unpollinated flowers after the crossing has been effected increased the proportion of seed set. Eight hybrid seedlings were obtained but three died in the early stages of development and the other five proved to be identical with the mother plant. Crosses between the extreme types within *C. Thea* Link would therefore appear to be more promising. Japanese tea pollinated by Indian tea produced a number of hybrids. Thus in family 13, 20 seeds were obtained from 25 crosses and gave rise to 19 normally developed seedlings; five of them were of the maternal type but the rest showed combinations of the parental characters; the leaf was intermediate in size, thin and tender as in the Indian parent with a long pointed tip.

In family 14 of the same cross 20 seedlings were obtained from 25 pollinations, but all were of the maternal type. In family 15, 12 seedlings were obtained, of which three resembled the Japanese parent and nine possessed characters of both. The pollen parent in all these three crosses was the same. All the hybrids are distinguished by extreme winter-hardiness. Back-crossing the hybrids on to Indian tea produced again a segregating progeny, in which the types with the smallest leaves resembled the Japanese form; thus in family 31, from 25 pollinations, 13 seedlings were obtained, of which nine resembled Japanese tea and four showed characters of both parents. No predominance of maternal characters was observed in this combination. Similar segregations were obtained in crosses of Ceylon teas of a type closely resembling the Indian type with Japanese tea; family 24 contained 34 plants resembling the Japanese type and 11 with characters of both parents. Such plants, which have, according to Lysenko, a shattered inheritance, afford valuable material for further work on increasing the frost resistance of tea.

Hybridization between closely related groups gives a more uniform progeny: crossing Chinese x Japanese gives a mixture of Chinese and Japanese types, Ceylon x Chinese gives a mixture of Chinese and Ceylon, Indian x Ceylon a mixture of Indian and Ceylon, etc.

The exact expression of the characters of the two parents is influenced by the growth conditions under which the plant is raised. For instance, hybrids between Indian and Japanese teas when grown under poor conditions resemble the Japanese parent but can be induced to develop much greater resemblances to the Indian type by applying suitable cultural measures in the early developmental stages.

Attempts at self-pollinating promising hybrids were made in the early stages of the work but were given up as unsuccessful. Self-pollination led to a loss of both vigour and quality in the offspring. Even the seeds from selfing were under-sized and low in germinating capacity. It was later found that even plants from artificial hybridization were less vigorous than those obtained from group or mass pollination, where each plant was free to exert selective fertilization. However, uncontrolled pollination often leads to a reduction in quality; thus Ceylon tea, which is of hybrid origin, gradually reverts to the Chinese type, and Chinese tea becomes smaller and smaller in the leaf. It would appear that each type, when left to open pollination in a mixed stand, tends to become pollinated by a type that is biologically stronger—the Indian by the Ceylon and Chinese types, the Ceylon by the Chinese, and only the Japanese type is pollinated mainly by its own kind. Even the flowers from the extreme outside of a Japanese tea bush grown in proximity to other types produced exclusively Japanese types in the progeny. Natural crossing between the extreme groups, Japanese x Indian, occurs extremely rarely and even artificial crosses are not easy to accomplish.

This natural degeneration can be avoided only by constant selection and by artificial pollination from a suitable pollinator: if the object is to improve the quality, then the pollinator should be in the group above; if the object is to improve vigour, then the pollinator should be from the group below, whilst for maintaining the type the pollinator should belong to the same type.

Plants of Ceylon and Chinese tea were pollinated with a mixture of pollen from 20 or more plants of the Ceylon type. One mother plant, No. 521 of the Ceylon group, when so pollinated produced 522 seeds, from which 387 seedlings were obtained; they were all of the Ceylon type, uniform in development and all corresponded entirely to the maternal type. This is considered to be one of the most promising methods of improving tea and of producing commercial seed.

1278. VORONCOV, V. E.

633.72:581.6:633.8(47)

(The art of tea scenting).

State Tea and Sub-Tropical Crops Res. Inst. Tiflis 1939 : Pp. 125.

With an increase in the production of tea in the U.S.S.R. there arose simultaneously the need to improve its flavour, for which the recognized means is the artificial scenting of tea to harmonize with its weak natural aroma. In this interesting monograph, which is in a sense an unique contribution to the technology of tea, the author has embodied the information on the subject scattered in the rather meagre literature, from an ancient Chinese botanical tract to the modern investigations by the Japanese, Dutch, English and German research workers. In addition, he has placed on record his own numerous tests and experiments carried out in the Georgian S.S.R. during a period of 2 years. A series of valuable practical conclusions emerged from his researches. In eastern and south eastern Asia (China, Japan, Indo-China) all the commercial brands of tea were always scented artificially, though the process in its various modifications was a closely guarded secret; the producers of Indian, Ceylon and Dutch teas concentrated mostly upon producing such varieties of tea plant as would retain to a great extent its natural flavour and aroma after having been subjected to the manufacturing process, and only very rarely resorted to the artificial scenting of tea. The latter course was found impracticable for the Transcaucasian varieties of tea. The study of the essential oil distilled from the green leaves and from the black tea grown in Georgia revealed the fact that it contained about 26 identifiable chemical components which possessed such scents as those of rose, *Citrus* flowers, jasmin, honey, narcissus, lily of the valley, bitter almonds, freshly mown hay, birch buds, and a flowery scent. Exhaustive tests with fresh flowers and extracts of essential oils of numerous plants showed that some varieties of roses, jasmin, *Olea fragrans* and *Citrus* flowers blend well with the natural aroma of tea and impart to it a lasting scent which enhances its market value and consumption; inconclusive results were obtained with narcissus and *Polyanthes tuberosa*, which will be the subject of further tests. The best results were obtained with blends of scents and not with single aromatic ingredients.

H. F.

OIL PLANTS 633.85

1279. MAJDRAKOFF, P.

633.85:575(49.7)

Die Züchtung der Ölpflanzen in Bulgarien. (**Breeding oil plants in Bulgaria**).

Mitt. Landw. 1944 : 59 : p. 122.

The climate and soil of Bulgaria is stated to be suitable to a greater or lesser extent for the cultivation of sunflower, rape, cotton, hemp, flax, soya, castor oil plant, poppy, groundnut and sesame and since 1919 selection has been applied to various oil bearing plants as part of the scheme to extend the country's production. As part of the government programme to increase the oil output, efforts are still being made to introduce selected varieties and intensive seed production.

1280.

633.85-1.524(47)

635.655:575"793"(47)

IGEL, G.

633.52:575.12:575.3(47)

Erfahrungen mit dem Ölfruchtbau in der Ukraine. (**Experience with cultivation of oil plants in the Ukraine**).

Mitt. Landw. 1944 : 59 : 16-17.

In this account of two years' work by German investigators in the Ukraine the suitability of the various oil-bearing plants to the conditions there is discussed. The soya-bean seemed best adapted to the local conditions, but in order to extend its range of cultivation early and drought-resistant types would be required. The early variety Herb-Müller 22 recently introduced into the Ukraine gave very good results and the varieties of the breeders Dickmann and Bitterhoff were equally successful.

All uniform and newly introduced varieties were tested for drought resistance and those that proved specially resistant were to be grown mainly in the south.

Work with hybrid and other flaxes, produced by German breeders, showed that dual purpose types combining yield of seed with a useful fibre length were best suited to the region.

1281.

633.853.49:575(43)

Gute Erfolge der Raps- und Rübsenzüchtung. (**Good results of rape and turnip rape breeding**).

Forschungsdienst 1944 : 17 : p. 51.

Hitherto there has been only one pedigree variety of winter turnip rape, Lembke-Malchow, to meet the needs in most regions of Germany. Now, however, a new strain from East Prussia, the Grubersche, has been approved; it is specially winter hardy and therefore suited to the eastern districts. The only other winter turnip rape approved for the variety lists is the Styrian which has been retained in the south east as a land variety for its early ripening habit and in spite of its not very high yield. Breeding operations have been begun with this crop.

Rape breeding has recently been concerned *inter alia* with improvement to prevent shedding of the seed and one new strain bred by Dippe Bros, Quedlinburg, has been approved for the official list in view of its great improvement in this respect.

1282.

TURESSON, G. and

NORDENSKIÖLD, H.

633.853.49:575.127.5:635.15:576.356.5:581.04

Chromosome doubling and cross combinations in some Cruciferous plants.

Ann. Agric. Coll., Sweden 1943 : 11 : 201-06.

The following hybridizations have been effected involving the genera *Brassica*, *Sinapis* and *Raphanus*: *B. Napus* (diploid) x *B. nigra* (tetraploid), *B. Napus* (diploid) x *R. sativus* (tetraploid), *B. Napus* (diploid) x *B. Rapa* (tetraploid), *B. nigra* (tetraploid) x *S. arvensis* (tetraploid) and *S. arvensis* (tetraploid) x *R. sativus* (tetraploid). Tetraploid lines were obtained by colchicine treatment.

Most of the hybrids obtained were sterile with the exception of 9 presumed amphidiploid plants from *B. Napus* x *B. Rapa* and the progeny of *B. nigra* x *S. arvensis*. *S. arvensis* x *R. sativus* was pollen fertile but produced few seeds.

1283.

DOMINGO, W. E.

633.853.55:575.11:581.162.32

Amount of natural out-crossing in the castor oil plant.

J. Amer. Soc. Agron. 1944 : 36 : 360-61.

The character "spineless" is determined by a single recessive gene *s*; the heterozygous spinous forms could not be distinguished from the *SS* types. By growing the double recessive strain in close proximity to the dominant variety, a high percentage (average 36%) of out-crossing could be demonstrated.

1284.

633.853.74:575.12:578.08

LANGHAM, D. G.

633.853.74:575.12(87)

Un método nuevo para efectuar polinización controlada en el ajonjolí (*Sesamum indicum* Loew) y una estimación de la hibridización natural. (**A new method of artificially pollinating *S. indicum* Loew and an estimation of natural crossing**).

Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1943 : No. 4 : Pp. 7.

Emasculation is performed by removing the corolla, with the anthers attached, the day before the stamens open. The leaf subtending the flower is cut off to the length of the corolla and is enclosed together with the emasculated flower in a gelatine capsule. The number of seeds set per flower is nearly as great as the number obtained by natural pollination.

When 81 flowers were emasculated and left uncovered, 10 of them produced seeds by natural pollination; 91 emasculated flowers left unpollinated and covered with gelatine capsules produced no seed at all.

Glabrous plants growing amongst ordinary pubescent plants gave 4-6% of pubescent plants in their progeny, which must be the result of out-pollination, since glabrous plants when artificially selfed, bred true.

1285.

633.854.78:575(49.7)

633.854.78-2-1.521.6

Neue Sonnenblumenzüchtung in Bulgarien. (**New sunflower breeding in Bulgaria**).

Mitt. Landw. 1944 : 59 : p. 77.

The Bulgarian Ministry of Agriculture has been concentrating on the improvement of the

sunflower and high yielding varieties very resistant to diseases and pests have been bred. The branched type, which is low yielding, is being replaced by the single stemmed type. The breeding of the type of sunflower whose seeds have a protective layer of cells as a defence against the "sunflower moth" has been successful (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 444). At present the experiment stations are working on the production of a variety resistant to *Orobanche ramosa*.

1286. ETCHEPAR, J. A. 633.854.78:581.162
La biología floral del girasol y su relación con la técnica del mejoramiento.
(**The floral biology of the sunflower and its relation to the technique of improvement**).
Rev. Argent. Agron. 1944 : 11 : 11-19.

Cutting off the styles at different times showed that fertilization takes place at about the stage when the stigmatic lobes separate. Emasculation was effected by removing the anthers just before this stage. The highest percentage of seeds was set when the flowers were pollinated the day after emasculation but successful pollinations were made even after 5 days. The pollen retained its viability for 10 days at room temperature. Bagging with paper bags was found to be more effective than with cotton.

1287. ZAHAROV, B. S. 633.854.78-2.5:581.14.035
(**The length of the daylight period, and its influence on the incidence of infection by Orobanche in the sunflower**).
Doklady Akad. Nauk SSSR. 1940 : 27 : 265-67.

The author describes three experiments with *Orobanche* as a parasite on sunflowers, and concludes that short hours of daylight favour the development of the parasite, causing it to appear even among varieties of sunflower which, under normal conditions of daylight, are immune to it. The greater prevalence of the parasite in southerly latitudes than in those further north, may, perhaps, be explained by these results. The phase of development of the sunflower had no noticeable connexion with the incidence and degree of infection. I. Z.

1288. BEIRNAERT, A. and 633.855.34:575.11:582
VANDERWEYEN, R. 633.855.34:57.087.1
Contribution à l'étude génétique et biométrique des variétés d'*Elaeis guineensis* Jacquin. (**A contribution to the genetical and biometrical study of varieties of *Elaeis guineensis* Jacquin**).
Publ. Inst. Nat. Agron. Congo Belge 1941 : Sér. Sci. No. 27 : Pp. 101.

After a review of some existing classifications, the genetical and taxonomic value of the characters employed in classification is considered. The character thickness of shell can be divided into three distinct types: *dura* with a thick shell, *pisifera* without a shell and *tenera*, a hybrid between the two with a thin shell. Two factors *A* and *a* are responsible for the presence or absence of shell and there are a number of other factors which cause variation in the degree of thickness of the shell and abnormal segregations. Types *dura* and *pisifera* are therefore definite varieties and *tenera*, though from a systematic point of view not strictly a variety, yet for convenience may be so regarded.

The character "mantled type" is inherited and may be a dominant as researches in progress may show. *E. Poissoni* Annet, the mantled type, is regarded as a subspecies.

There are three types of pigmentation of the fruit: *nigrescens*, *virescens* and *albescens*. *Virescens* represents a dominant character and *albescens* is probably recessive to the other two but the data are so far insufficient to decide. These characters distinguish the sub-varieties. The oil palm of Madagascar, *E. madagascariensis*, discovered by Perrier de la Bathie, is characterized by the red colour of its fruits and may be considered as a fourth sub-variety, *rubescens*.

The type of foliolar insertion which produces the "king palm", var. *idolatrix* of Chevalier, is inherited and its transmission is being investigated. It is probably a mutant from the ordinary type. Biometrical studies on the three types, *tenera*, *dura* and *pisifera* show that there are no vegetative differences between *tenera* and *dura*. *Pisifera* has a more luxuriant growth due to its genetical constitution. Biometrical details are also given on the fruit clusters and fruit of the three types. It is concluded from these studies that the following characters may be used as a basis for classification (1) presence or absence of extra carpels (mantled type); (2) thickness of the shell; (3) pigmentation of the fruit; and (4) type of leaflet insertion.

As regards selection, it is held that the improvement effected by selection based on the *tenera* type carried out at the Yangambi Station is much superior to that based on the type with a thick shell. R. M. I.

RUBBER PLANTS 633.91

1289. PERRY, B. A. 633.912:576.312.35
Chromosome number relationships in the genus *Euphorbia*.
 Chronica Botanica 1943 : 7 : 413-14.

Somatic chromosome numbers of 12, 14, 16, 18, 20, 24, 28, 30, 40, 42, 56, 60, *c.* 100 and *c.* 200 have been discovered in an investigation into the cytology of 69 *Euphorbia* species. The basic chromosome number of the genus is regarded as 8, with secondary systems based on 6, 7, 9, 10 chromosomes. *E. dentata* Michx. includes diploid ($2n = 14$), tetraploid and octoploid varieties. The 8-chromosome series includes the less specialized types and a lower percentage of perennials than the 10-chromosome series; a basic number of 8 also characterizes other genera of the Euphorbiaceae. It is believed that the direction of evolutionary development has been from annual to perennial habit. (Cf. also "Plant Breeding Abstracts", Vol. XIII, Abst. 273).

1290. PADDOCK, E. F. 633.912:576.312.35:581.04
On the number of chromosomes in *Hevea*.
 Chronica Botanica 1943 : 7 : 412-13.

A cytological investigation of a cultivated *Hevea* variety from Liberia demonstrated the presence of 36 diploid chromosomes. Further information on the chromosome numbers of *Hevea* varieties is desirable since the numbers published to date ($2n = 16, 34$, and 36) do not form a polyploid series. Apparently mixoploid tissues have been obtained by colchicine treatment.

1291. 633.912-2.421.9-1.521.6:575.12(73)
***Hevea* hybrids for the western hemisphere.**
 Agric. Amer. 1944 : 4 : p. 37.

Hevea hybrids with high latex yields and resistance to South American leaf disease have been developed.

1292. WARMKE, H. E. 633.913:581.162.52
Self-fertilization in the Russian dandelion, *Taraxacum kok-saghyz*.
 Amer. Nat. 1944 : 78 : 285-88.

T. kok-saghyz is normally self-sterile although "end-season" self-fertility occurs in December. An analysis of the progenies of the self-fertilized plants lends no support to the hypothesis of apomictic development for a marked segregation of morphological characters was observed. Flowering maxima are evident in April and November, a period of summer dormancy intervening.

1293. NYLOV, W. I. and
 MICHELSON, L. A. 633.956:581.6:575.127.2
(New chemical compounds obtained through distant hybridization).
 Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 95-98.

Hybrids between *Ocimum canum*, whose essential oil contains 60% of camphor, and *O. basilicum* in which the oil contains 14% eugenol, were fertile and F_2 , F_3 and F_4 generations have been obtained from them. Transgressive segregation for most morphological features was observed in the second and later generations. One F_3 plant was found to contain 40% camphor, 2-8% eugenol and also 43% of linalool and borneol and 3-6% of citral. None of the last three compounds was present in the parental species or in the F_1 . It is pointed out that linalool and citral are much simpler in structure than the complex cyclic compounds characteristic of the parent species.

FRUIT TREES 634

1294. TOLMAČEV, A. I. 634:577.16(47)
(Scientific notes—A study of vitamin-bearing plants in the northern regions).
 Sovetskaja Botanika (Soviet Botany) 1942 : 6 : 48-50.

This is a short account of some plant species containing vitamin C which occur along the valleys of the rivers Vyčegda and Dvina (near Archangel). In addition to a few comparisons between *Rosa cinnamomea* and *R. acicularis*, the quantities of vitamin C contained in several other species are also given. It is suggested that red currants may prove to be richer in vitamin C than is commonly supposed, if the analysis of *Ribes hispidulum* be at all indicative. Some species of both *Rumex* and the Umbelliferae also contain fairly large amounts of vitamin C. The leaves, stems and inflorescences were analysed separately.

I. Z.

1295. EINSET, J. 634.11:576.356.5
The occurrence of a tetraploid and two triploid apple seedlings in progenies of diploid parents.
 Science 1944 : 99 : p. 345.

A relatively high frequency of triploid and tetraploid offspring has been discovered in the progenies of the crosses Delicious x Bedford and Macoun x Jonathan respectively.

1296. SMITH, M. A. 634.11-2.3-1.521.6:582:001.4
Blister spot, a bacterial disease of apple.
 J. Agric. Res. 1944 : 68 : 269-98.

Varietal differences in the resistance of apple trees to bacterial spot are reported. The pathogenic organism is regarded as a variety of *Phytomonas* (= *Pseudomonas*) *Syringae*.

1297. 634.11.00.14:581.6(43)
 634.11:575.3(43)

Aufstellung einer Reichssortenliste für Äpfel. (**Drawing up an official list of varieties for apples**).

Forschungsdienst 1944 : 17 : p. 53.

To ensure uniform high quality apples, lists of approved varieties, found satisfactory by the German market and growers, have been drawn up. More detailed local lists of varieties specially suited for particular localities are also to be issued. Frost resistant and adaptable stem builders are regarded as important requirements.

A further plant list dealing with all local conditions and with root stocks has also been worked out.

1298. KIPER, N. Ö. 634.13(56)
Orta Anadolu armutculuğu ve en mühim armut çeşitleri. (Central Anatolian pear culture and the most important pear varieties).
 T.C. Yüksek Ziraat Enstitüsü Çalışmalarından, Ankara 1941 : No. 123 : Pp. 98.

Descriptions of the following pear varieties have been drawn up: Tokat, Zerdemi, Ürüngüş, Sari armut, Şeker armudu, Hoşaf armudu (= Compote), Göksulu, Ak armut, Deste Basan, Güllabi, Leblebici, Çördük, Esfehane armudu, Seğmenoğlu armudu, Ankara, Küpdüşen, Dikenli, Malatya, Mangir, Abbasi and Patlican.

1299. JENKINS, E. W. 634.13:581.162.3
Interrelation of pollination, position on cluster and set of pears.
 Bull Vt Agric. Exp. Sta. 1942 : No. 493 : Pp. 27.

When only the terminal and basal blossoms of a pear cluster are left thereon and pollinated, neither the position of the blossom on the cluster nor the time of pollination cause significant differences in the set of fruit sobeit cross pollination is done. However, the time of pollination seems to be an important factor when self-pollination occurs since the earlier applications of pollen always produced a greater set of fruit and more good seed.—*Author's summary.*

1300. PALMER, E. J. 634.15:582:001.4
 634.15:575.127.2
The species concept in *Crataegus*.
 Chronica Botanica 1943 : 7 : 373-75.

The taxonomic difficulties attendant on the study of *Crataegus* are reviewed. Many of the described species are probably synonyms or merely forms of other species. Interspecific hybridization is less common than often supposed owing to differences in the time of flowering.

1301. SCHRADER, A. L. and
 HAUT, I. C. 634.25:575.12(75.2)
Peach varieties : what's in the future ?

Trans. Peninsula Hort. Soc. 1943 : 33 : No. 5 : 32-37.

A new peach variety, Redskin, has been introduced by the University of Maryland. It is derived from a cross between Hale and Elberta and is described as a yellow and free-stone variety with firm flesh and good keeping qualities. The edible and canning qualities are high and it transports satisfactorily. The growth is vigorous and it ripens slightly earlier than Elberta.

NUTS 634.5

1302. GRAVES, A. H. 634.53-2.421.9-1.521.6:575.12
Chestnut breeding work in 1943.
 Brooklyn Bot. Gdn. Rec. 1944 : 33 : 11-13.

Hybridization projects for the development of blight resistant chestnut varieties continue.

An attempt is also being made to discover the proximate cause of resistance, and it is considered likely that the relative concentrations of the cell sap of bast and parasite are significant in this respect.

1303. LEBEDEVA, T. A. 634.58:581.14.035
(The length of the daylight period, and its influence on the growth of *Arachis*).

Doklady Akad. Nauk SSSR. 1940 : 27 : 262-64.

The length of the period between germination and the beginning of flowering was not notably affected when eleven varieties of *Arachis* were exposed daily during this period to daylight lasting only 10 hours. The plants thus treated were neither hastened nor delayed in passing through the light phase. The subsequent yields of nuts showed that though production by some of the varieties was increased under the influence of the shortened period of daylight, that of other varieties was unaffected by such treatment. The yields of foliage from all the varieties did not enable any responsiveness to a shortened daytime to be discerned.

In a second experiment with two additional varieties, one of the Spanish, the other of the Valencia type, it was shown that when the period of daylight was reduced to 10 hours at, but not before, the onset of the flowering stage, the yield of nuts was increased in the Spanish variety but not in the Valencia. The relative and absolute yields of foliage, however, from both varieties were reduced. I. Z.

OTHER FRUITS 634.6

1304. 634.653:575.061.1:581.143.26:581.162
Avocado research.

Calif. Cultiv. 1942 : 89 : p. 195.

[From Biol. Abst. 1943 : 17 : Sect. D : Abst. 2768].

Work is in progress at the University of California to change the alternate bearing habit of the Fuerte avocado and to find strains of it or other varieties more uniformly productive and better suited to the southern Californian climate. Various other improvements are being sought by hybridization of the Fuerte.

1305. *ROZANOVA, M. A. 634.71:575.127
(Distant hybridization within the genus *Rubus*).

Vestnik Gibrizacii (Hybridization) 1941 : No. 2 : 21-50.

A detailed review is given of the author's extensive work on crossing species belonging to different sub-genera of the genus *Rubus*. All crosses between species of the sub-genus *Idaeobatus* and sub-genus *Cylactis* failed except *R. vulgatus* x *R. xanthocarpus* and *R. illecebrosus* x *R. xanthocarpus*.

The only combination of *Idaeobatus* x *Anoplobatus* that set seed was *R. illecebrosus* x *R. odoratus*; the hybrid was fully fertile and on account of its spectacular flowers it is of interest as an ornamental plant.

The only *Idaeobatus* x *Chamaemorus* cross was *R. vulgatus* x *R. chamaemorus*, which set no seed whatever.

In the combination *Idaeobatus* x *Eubatus* several crosses were made, *R. vulgatus* x *R. caesius* receiving the most attention. Several forms with increased chromosome numbers were obtained from this combination, including forms with 28, 35 and 42. The 28 and 42 chromosome hybrids are extremely fertile but require further improvement as regards quality.

A number of crosses were made between the sub-genera *Cylactis* x *Anoplobatus*, *Cylactis* x *Chamaemorus* and *Cylactis* x *Eubatus* but seeds were obtained only from one combination, *R. caesius* x *R. xanthocarpus*; the hybrid had 21 chromosomes and was sterile. The combinations *Anoplobatus* x *Chamaemorus*, *Anoplobatus* x *Eubatus* and *Chamaemorus* x *Eubatus* were also unsuccessful.

Interspecific crosses within the individual sub-genera were more successful and a number of them are described. Promising commercial hybrids have already been isolated from crosses of the variety English (*R. vulgatus*) x the American variety King (*R. strigosus*). Crosses of *R. occidentalis* x *R. vulgatus* have given a number of very fertile hybrids which are equal to the American varieties Cardinal and Haymaker in yield; they were however insufficiently resistant to frost. The F₂ segregations suggest that fruits of varying quality should be obtainable in the F₂ of this

* An extended abstract of this paper is on file at the Bureau.

cross, where the *R. occidentalis* parent has good preserving quality and the *R. vulgatus* parent good qualities of flavour.

A full report is given on the cytological behaviour of the different groups of hybrids.

It is concluded that the most promising crosses are those between the raspberries (*Idaeobatus*) and dewberries (*Eubatus*), where fertile hybrids may be produced by amphidiploidy. The sub-genus *Chamaemorus* is the furthest removed from all the rest and failed to cross with any of them. When species or races of equal chromosome number within the sub-genus are crossed hybrids are easily obtained and are completely fertile. When distantly related species of the same chromosome number within the sub-genus are crossed the hybrids are sterile. On crossing nearly related species of different chromosome number sterile hybrids are obtained.

An analysis of the F_1 of different crosses shows that very few characters retain their dominance in all crosses. Most characters are intermediate in inheritance with deviations towards either one parent or the other. In hybrids of *R. vulgatus* $\times$ *R. caesius* the expression of a character is in direct relationship to the proportion of the genomes of the parent forms in the hybrid. The *R. vulgatus* characters are most evident in the 28-chromosome hybrid which bears two genomes of *R. vulgatus* and two of *R. caesius*. The *R. caesius* characters are most evident in the 35-chromosome hybrid which has four genomes of *R. caesius* and one of *R. vulgatus*. The proportionality between the expression of a character and the relationship of the genomes is not however linear. In breeding spineless raspberries it is necessary to bear in mind that, in crosses between spined and spineless forms, spineless segregates may appear only in the second and third generations.

1306. BAILEY, L. H.

634.715:582(73)

Species Batorum Boreali-Americana. VIII. Alleghenienses.

Gentes Herbarum, Ithaca, N.Y. 1944 : 5 : 507-88.

This fascicle describes the section *Allegheniensis* of the genus *Rubus*. Several of the species have given rise to pomological varieties.

1307. OFFORD, H. R.,

QUICK, C. R. and

MOSS, V. D.

634.72:581.162.5

Self-incompatibility in several species of *Ribes* in the western states.

J. Agric. Res. 1944 : 68 : 65-71.

The following *Ribes* species were shown to be self-incompatible in the western states of the U.S.A.: *R. Roezlii*, *R. glutinosum*, *R. nevadense* and *R. viscosissimum*.

1308.

634.74:576.356:582

GUSTAFSSON, A.

634.74:575.127.2

The constitution of the *Rosa canina* complex.

Hereditas, Lund 1944 : 30 : 405-28.

An investigation into the cytology and inter-relations of the *R. canina* complex is reported. The basic chromosome number of the group is 7, *R. rugosa* being a diploid ($2n = 14$) and *R. canina* and *R. rubiginosa* pentaploids ($2n = 35$). Inter-crossing these species established the fact that reproduction was sexual and not apomictic. In all cases, the embryo-sac mother-cell forms 7 bivalents at meiosis, the other chromosomes remaining as univalents and moving eventually towards the chalazal end of the embryo-sac mother-cell. They all become part of the egg nucleus. At microsporogenesis, a similar formation of 7 bivalents occurs but the univalents lag at telophase II and are not included in the pollen grain nuclei.

Sexual reproduction is consequently heterogamous and from an analysis of the hybrid progenies obtained, the following genomic constitutions have been proposed: *R. canina* AAACD, *R. rubiginosa* BBBCF, *R. rugosa* CC, *R. canina* ♀ $\times$ *R. rubiginosa* ♂ AABCD, *R. rubiginosa* ♀ $\times$ *R. canina* ♂ ABBCF, *R. canina* ♀ $\times$ *R. rugosa* ♂ AACCD and *R. rubiginosa* ♀ $\times$ *R. rugosa* ♂ BBCCF. The significance of these conclusions for an understanding of the taxonomy of the group is discussed and an attempt made to correlate cytological observations with studies on natural variation. It is suggested that the extreme variability of *R. canina* may be due, in part, to differences between each of the three A genomes, any two of which may pair and cross-over at meiosis.

1309. BROWN, C. A.

634.75-1.524:575.127.2

History of the wild strawberry in Louisiana.

Home Gdng New Orleans, 1942 : 2 : 168, 174, 180.

A wild strawberry, *Fragaria Grayana*, has been rediscovered in Louisiana, and been used for hybridization experiments with the variety Klondyke.

1310. JEFFERS, W. F. and DARROW, G. M. 634.75-2.411.4-1.521.6:575.12(75.2)
The red-stele-resistant Temple strawberry.
 Trans. Peninsula Hort. Soc. 1943 : 33 : No. 5 : 43-44.

A new strawberry variety Temple, derived from an Aberdeen x Fairfax cross, is said to be resistant to red stele disease. It grows vigorously, making a dense bed of tall plants. The foliage is resistant to leaf-spot and leaf-scorch. Although nearly as early as Blakemore it is not so firm or so acid. The berries are large, blunt, conical, smooth and uniform, and are well suited to long-distance transportation. This variety is suitable for growing in moist, fertile soil and is not subject to frost injury.

VITICULTURE 634.8

1311. AKMAN, A. 634.835(56)
 Ortaanadolu ve bilhassa Ankara mintakasi sarapları üzerinde araştırmalar.
(Researches on viticulture in Central Anatolia, with special reference to the Ankara region).
 T.C. Yüksek Ziraat Enstitüsü Çalışmalarından, Ankara 1941 : No. 116 : Pp. 63.

Short descriptions are given of the vine varieties Hasandede, Sungurlu, Kalecik (white and red types), Pekmez üzüümü, Kara saçak and Mor saçak from Ankara, and Beyaz dimrit, Kırmızı dimrit and Karalık from Kayseri-Niğde.

1312. 634.835:575.242(73)
White Niagara grape produces a "sport".
 Agric. Amer. 1944 : 4 : p. 97.

A red-fruited mutation of commercial value has appeared in the stock of white Niagara grapes introduced into Brazil.

1313. SMITH, M. B. and OLMO, H. P. 634.835:576.356.5:577.16
The pantothenic acid and riboflavin in the fresh juice of diploid and tetraploid grapes.
 Amer. J. Bot. 1944 : 31 : 240-41.

Diploid and tetraploid strains of the same grape variety do not appear to differ significantly in the content of riboflavin but the tetraploids have more pantothenic acid. The latter vitamin is present in greater quantity in varieties derived from *Vitis Labrusca* x *V. vinifera* than in the *V. vinifera* types.

FORESTRY 634.9

1314. ULLÉN, G. 634.97:575(48.5)
 Skogsvårdsföreningens exkursion till Skåne. **(Excursion of the Sylvicultural Society to Scania).**
 Skogen 1943 : 30 : 255-57.

During this tour demonstrations were given on (1) the plant breeding work done at Svalöf on the production of high yielding wheats, wheat rye hybrids, e.g. Triticale and rivepan, the latter being derived from Swedish varieties, and (2) the work at Ekebo on giant aspens, birch, and the techniques of bottle grafting and strangulation combined with hormone treatment, which have been used to hasten reproduction in breeding forest trees.

1315. ANDERSSON, E. 634.97:575.1:633
 Växtförädlingen och skogsbruket. Ett diskussionsinlägg. **(Plant breeding and forestry—A contribution to the discussion).**
 Skogen 1943 : 30 : 178-80.

While agreeing with Petterson (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 642) on the great importance of silviculture in increasing production and on the distinction between what constitutes breeding operations and what silvicultural measures, the writer challenges various points in Petterson's argument and especially its statistical basis, which is here criticised in detail. In conclusion, formulae are given, based partly on recent work by O. Tedin, for determining under certain essential conditions the effect of selection in the case of quantitative and qualitative characters. To obtain the necessary statistical data in such cases, however, progeny tests must

(1) be laid out in the same locality as the original stand from which the progeny came and (2) include trees from all height classes in the stand.

Experiments conducted according to a suggested plan are needed to elucidate the effect of selection in collecting seed (1) from élite trees without progeny testing and (2) from élite trees in élite stands that have been thinned with an eye to trees for seed.

1316. PETTERSON, H. 634.97:575.1:633
Skogsskötsel och växtförädling. (**Forest management and plant breeding**).
Skogen 1943 : 30 : 195-96.

The writer points out that, while he is in favour of the application of plant breeding to forestry, he is critical of the methods contemplated to attain that end. Replies in some detail to Sylvén's and Andersson's criticisms (cf. Absts 1317 and 1315) occupy the rest of the paper.

1317. SYLVÉN, N. 634.97:575.1:633
Skogsskötsel och växtförädling. (**Forest management and plant breeding**).
Skogen 1943 : 30 : 148-49.

In reply to criticism by Pettersson (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 642) of the author's views on the above subject (cf. "Plant Breeding Abstracts", Vol. XIV, Absts 318 and 640), further arguments along the same lines are presented here. In conclusion the value of the comb spruces (*kamgran*) and the genetic basis of its superiority to other spruce types are brought out and close co-operation between the breeder and the practical forester is again stated to be essential to progress in Swedish forestry.

1318. TIRÉN, L. 634.97-1.521.5:581.142:578.08(48.5)
Tallfröets grobarhet i Norrland. Preliminärt meddelande. (**Germination capacity of pine seed in Norrland—Preliminary communication**).
Skogen 1944 : 31 : p. 16.

As part of research planned to discover a rapid method for a preliminary determination of germination capacity before collecting cones, the Swedish Forestry Research Institute (Skogs-försöksanstalt) conducted an enquiry last autumn on pine cone samples taken from different altitudes in Norrbotten, Västerbotten, Jämtland and Kopparberg. The data obtained on the germination of pine seed are also of value in arriving at the possibilities of cone collection in winter and are therefore provisionally recorded here.

A tabular summary for the various districts, altitudes and latitudes is given, showing the 1000-seed weight and percentage germination after 10 days. This percentage was on the whole satisfactory though characterized by marked local variations.

Certain latitudes and altitudes are specified as quite suitable for pine collection in autumn to augment supplies of seed for Sweden. Storage under proper conditions is necessary.

1319. 634.97-1.531.12:575(48.5)
Rationalisering av frö- och plantanskaffningen vid skogsodling. Föredrag av jägmästare Harald Sjöström vid Svenska skogsvårdsforeningens årsmöte. (**Rationalizing the supply of seed and plants in silviculture. Lecture by Forest Officer Harald Sjöström at the Annual Meeting of the Swedish Silvicultural Association**).
Skogen 1943 : 30 : 207-09.

The lecture, of which this article is a condensed report, dealt with:—

(1) The difficulties of providing adequate high-grade seed for the wide scale extension and improvement of Swedish forests, with special reference to the conditions and requirements in Norrland.

(2) The incidence of seed production in pine and spruce, mention being made of climate, locality, germination capacity, etc. as factors in the production of suitable seed for different regions, O. Heikinheimo's work on forest seed production in Finland being cited as relevant to Swedish conditions as well.

(3) The importance of genotype in the selection of élite trees for high-grade seed production and the value of genetic research in forest improvement.

(4) Planting as the main method of cultivation in the high lying regions of Norrland, especially as regards pine which is more sensitive than spruce to removal from one area to another.

(5) Measures to improve élite trees including progeny tests, due reference being made to the work of B. Lindquist, H. Jensen, and Langlet.

(6) The raising of self-sown plants as material for forest cultivation, the advantages and disadvantages of using such plants, and the potential role of such "natural plant nurseries" in practical forestry.

In conclusion it was pointed out that, in addition to ensuring the use of good seed and good plants, the technique of cultivation should be examined with a view to obtaining the best and most economical results.

1320. B....., R. 634.97-1.531.12:575.42(48.5)
 Skogsfröförsörjningen i Gävleborgs län. (**Supplying forest tree seed in the
 Gävleborg district**).
 Skogen 1943 : 30 : 307-08.

On an excursion organized by the Forest Protection Board an account was given of the Board's present work in the supplying of improved seed from cones gathered in stands of trees with a desirable type of branching and crown. Since genetical research has raised the standards in regard to branch quality in stands for seed, suitable stands for cone selection must be surveyed or mapped. Clear definitions of such stands and a uniform classification scheme for forest tree seed formed the subjects of a discussion by the members of the excursion. Among the points dealt with by Lindquist but not further elaborated here were: how supplies of high-grade seed could be provided; the results of surveys of élite trees and stands; the possibility of meeting requirements by élite seed and the economic consequences in Swedish forestry of the general use of fast growing and high quality seed. Jensen discussed: the intensification of seed production by establishment of seed plantations when the best élites are used for all seed production; the use for seed production of dwarf forms obtained by grafting material from progeny tested élite trees on suitable slow growing mother trees with abundant cone formation; and the use of such grafts to obtain seed from altitudes which normally depress seed production.

A demonstration of élite pines showed great variation in size and habit. Other experiments showed promising results in regard to the possibility of increasing the increment by judicious transference of spruce seed from south to north.

The need for co-operation by the Forest Protection Board in the practical work in progress on race improvement by breeding was discussed, and collaboration also with owners in ensuring that good seed is planted. The surveying and recording on maps of élite trees and stands should proceed with all speed. The designations adopted for the grades of seed from such sources, when for sale, are cited. A simplified system of zoning of the district was agreed upon for pine, spruce and birch and general support was promised for a scheme to produce high-grade seed from seed plantations in the district.

1321. Föreningen för växtförädling av skogsträd. (Association for the Breeding
 of Forest Trees). 634.972:575(48.5)
 Skogen 1944 : 31 : p. 112.

In this brief press report on the annual meeting held at Gillet in 1943, the Association's work at the Värmland and Norrland affiliated stations on the production of improved races of forest trees whose superior characters are genetically conditioned is mentioned.

Branch stations have been set up at Brunsberg in Värmland, and Dalfors in Dalarna, and another at Backe is being moved to Sundmo in Ängermanland, where a large plant breeding institute for all Norrland is to be established.

The work of the stations has consisted mainly in surveying and collection, as well as nursery work and field experiments for progeny testing. (See also "Plant Breeding Abstracts", Vol. XIV, Abst. 1005).

1322. DUFFIELD, J. W. 634.972.2:576.356.5
 Polyploidy in *Acer rubrum* L.
 Chronica Botanica 1943 : 7 : 390-91.

A. rubrum comprises a polyploid series in which approximate counts of $2n = 78$ and $2n = 104$ were made. Most species of *Acer* have a haploid chromosome number of 13. No significant relation between stomatal size and chromosome number could be established.

1323. TARTAKOWSKY, H. S. G. and ARENTSEN S., S. T. 634.972.3-2.452-1.521.6
 La roya del álamo en Chile. (**Poplar rust in Chile**).
 Bol. Sanid. Veg., Chile 1941 : 1 : No. 2 : 21-32.

Fungicidal methods have not provided a satisfactory method of control for *Melampsora Larici-populina* Klebahn in Chile and a search for resistant species was instituted. *Populus nigra* var. *italica* proved the most susceptible, while the Italian variety Arnaldo Mussolini, thought to be a hybrid of *P. canadensis* x *P. nigra*, was resistant.

P. eucalyptoides, *P. angulata*, *P. laurifolia* and *P. vernirubens* were all susceptible.

1324. 634.972.5:575.127.2:582(93.1+94)
 Arter, hybrider och skogar av sydboksläktet (*Nothofagus*) i Nya Zeeland och Australien. (**Species, hybrids and woods of southern beech *Nothofagus* in New Zealand and Australia**).
 Svensk Bot. Tidskr. 1944 : 38 : 123-26.

On the basis of palaeontological and other evidence the author suggests that the decrease in the range of variation and the present differentiation of species of *Fagus* in different part of the northern hemisphere and of different groups of *Nothofagus* species in various parts of the southern hemisphere can be explained by the extinction of certain genes in the different areas occupied by these two genera. There are no indications of divergent evolution in the accepted sense, i.e. towards a greater multiplicity of forms within both genera.

The distribution of *Nothofagus* species in the vegetation of New Zealand and Australia is discussed.

Observations in parts of New Zealand show that *N. Menziesii* does not cross with any other species, but that the species *N. Solandri*, *N. truncata*, *N. fusca* and *N. cliffortioides* form a commiscuum, in which the hybrids *N. Solandri* x *N. truncata* and *N. cliffortioides* x *N. fusca* are easily identified.

1325. LITTLE, E. L. (jun.). 634.973:582(72)
***Ochroma lagopus* Swartz, the name of the balsa of Ecuador.**
 Caribbean Forester 1944 : 5 : 108-14. (Mimeographed).

The taxonomy and nomenclature of the genus *Ochroma* is discussed. The various species, all known as balsa, are doubtfully distinct and may be mere varieties of one species. The correct name of the West Indian form is uncertain but is probably *Ochroma lagopus* Swartz.

1326. HOPP, H. 634.973:582:519.24
Multiple measures for distinguishing closely related plant forms.
 Chronica Botanica 1943 : 7 : 402-03.

A discriminant function, calculated from five quantitative characters, has been used to differentiate between the Shipmast and common Black Locust on Long Island.

1327. ÅHLMAN, S. 634.975:575.061.1:578.08
 Hur tidigt kan anlag för smal- eller bredkronighet konstateras? (**How early can the tendency to narrow or broad crown be determined ?**)
 Skogen 1943 : 30 : p. 231.

The possibility of distinguishing by measurement of the top and lateral shoots between narrow and broad crowned spruce or pine as early as the third year of growth should be experimentally tested.

1328. GARDNER, V. R. 634.975-2.111-1.521.6
Winter hardiness in juvenile and adult forms of certain conifers.
 Bot. Gaz. 1944 : 105 : 408-10.

The juvenile reversion type of branch in *Juniperus chinensis* and *J. horizontalis* is more winter hardy than the adult cupressoid type.

VEGETABLES 635

1329. DAVIS, G. N. 635.25:575.12
A newcomer named "Red" is first hybrid onion.
 Sth. Seedsman 1944 : 7 : No. 4 : 13, 52.

California Hybrid Red No. 1 is an F_1 hybrid from Italian Red 13-53 x Lord Howe Island. It yields well and is adapted to central California and southern Utah.

1330. KRICKL, M. 635.25:581.142:575
 Neue Möglichkeiten der Züchtung von Speisezwiebeln. (**New possibilities in the breeding of table onions**).
 Forschungsdienst 1943 : 16 : 227-39.

In the main, this paper recapitulates the matter of an earlier paper (cf. "Plant Breeding Abstracts", Vol. XIV, Abst. 653) and re-emphasizes the correlation between late sprouting, small loss in weight during storage, and high osmotic pressure. Some additional remarks on the possibilities of utilizing winter onions as spring onions and the influence of the size and quality of planting-out onions on the culinary product are added.

1331. LEVAN, A. 635.26:576.356.5:581.162
 Notes on a progeny plant of *asynaptic Allium amplexans*.
 Hereditas, Lund 1944 : 30 : p. 468. (Abst.).

Triploid plants of *A. amplexans* ($2n = 21$) are characterized by complete asynapsis in the pollen grains and sometimes at least, in the embryo-sac mother-cell. Such plants may be propagated apomictically in nature but sexual fertilization is also possible, a pentaploid ($2n = 35$) having been produced by cross-pollinating a female plant.

1332. COULTER, F. C. 635.615-1.524(73)
 Watermelon—the summer favorite is of African origin.
 Seed World 1944 : 55 : No. 2 : 12-13, 35.

A short popular account is given of the early history of the water-melon and its introduction to the American continent.

1333. ISBELL, C. L. 635.624:575.12(76.1)
 Taking the "Punk" out of southern pumpkins.
 Sth. Seedsman 1944 : 7 : No. 3 : 11, 51.

Alagold is a new pumpkin developed by the Alabama Agricultural Experiment Station as a selection from the Cushaw group of *Moschata* pumpkins introduced into the U.S.A. from Africa. The common southern varieties of pumpkins are of low quality, while the northern varieties are susceptible to insect attack under southern conditions. Alagold is resistant to all insects but not to the root nematodes. It produces a long slender vine rooting at the nodes. The fruits are described as "slightly bell, dumbell, to cylindrical in shape, with a small seed cavity located towards the blossom end". The colour is green in the immature fruit and yellow when mature. The flesh is thick, of a fine firm texture and has a deep, rich yellow colour. When cooked it is soft and sweeter than the ordinary southern pumpkin. The fruits store well and are good for dehydration and rehydration.

1334. BOWSER, P. H. 635.64:575.12
 The Early Chatham tomato.
 Quart. Bull. Mich. Agric. Exp. Sta. 1943 : 25 : 245-48.

The tomato variety Early Chatham is described. It is an early type which originated from a three-way cross between 216, Break O'Day and Redskin.

1335. LAMM, R. 635.64:576.356
 A case of abnormal meiosis in *Lycopersicum esculentum*.
 Hereditas, Lund 1944 : 30 : p. 253. (Abst.).

A cytological study of an aberrant plant of the variety Danish Export showed it to be a trisomic with precocious division of the centromere occurring in telophase I.

1336. CURRENCE, T. M. 635.64:581.162.5:575.113
 A combination of semisterility and two simply inherited characters that can be used to reduce the cost of hybrid tomato seed.
 Rec. Genet. Soc. America 1943 : No. 12 : p. 47. (Abst.).

A semi-sterile tomato strain is described in which an unusually long style reduces the chances of selfing. This character is determined by a combination of two recessive genes and it is suggested that it would be useful for hybridization experiments, doing away with the need for emasculation. The recessive characters potato-leaf and green-stem could be used as marker genes in order to identify hybrids in early stages of development.

1337. ISBELL, C. L. 635.64:581.165.71

Pass the word to gardeners : graft tomatoes onto weeds.

Sth. Seedsman 1944 : 7 : No. 4 : 14, 42.

The practice of grafting tomatoes and egg-plants to North American solanaceous weeds is recommended.

1338. MYERS, C. E. 635.64:581.6:575.12

Something new in tomatoes.

Seed World 1944 : 55 : No. 2 : 20, 36.

Two new varieties of tomatoes are described, Stemless Pennorange and Stemless Pennred, from a cross between an early red dwarf French stemless variety called Rouge Naine Hative and Marglobe. Both varieties have the stemless habit and possess an unjointed pedicel so that no part of the stem remains on the fruit when picked. The fruit is of a more even size than in the common varieties, higher in carotene content than normal in the Pennorange variety, and both are highly palatable.

1339. 635.64-2-1.521.6:577.16

Wild tomato of Peru has improved world food supply.

Agric. Amer. 1944 : 4 : p. 38.

The wild currant tomato of Peru is valuable to breeders on account of its resistance to leaf mould and bacterial canker, and on account of its high vitamin C value.

1340. EKINCI, A. S. 635.65(56)

Türkiye fasulya soy ve çeşitlerinin sistematik ve morfolojik tetkiki ve standardizasyona başlamak için ilk mesai. (**The beans of Turkey and a detailed systematic and morphological examination of the several varieties and a preliminary standardization for initial work**).

T.C. Yüksek Ziraat Enstitüsü Çalışmalarından, Ankara 1939 : No. 69 : Pp. 207.

This monograph deals with bean cultivation in Turkey from the standpoints of cultivation, diseases and pests, standardization, regions of cultivation, economic importance and research in progress on varieties grown in Turkey.

A bibliography and numerous illustrations are appended.

1341. LEBEDEF, G. A. 635.65:581.142

Seed viability in field beans.

Rec. Genet. Soc. America 1943 : No. 12 : 50-51. (Abst.).

Varietal differences in bean seed viability under the ordinary storage conditions of the tropics are reported. Selection No. 233 was superior in this respect.

1342. NAUNDORF, G. and HAASE, E. 635.651:576.356.5:581.04:577.17

Der Wuchsstoffhaushalt polyploider Pflanzenformen nach Colchicin-Behandlung. (**The amount of growth regulating substance in polyploid plants after treatment with colchicine**).

Naturwissenschaften 1943 : 31 : p. 570.

Experiments on the roots and shoots of 4-6 week old plants of *Vicia Faba* from seeds treated with colchicine showed that the production of growth promoting substances in the root is increased in the polyploid plants. R. M. I.

1343. MORTON, C. V. 635.652:582(73)

Taxonomic studies of tropical American plants. Notes on *Phaseolus*.

Contr. U.S. Nat. Herb. 1944 : 29 : 84-85.

The genera *Ramirezella* Rose and *Alepidocalyx* Piper are believed to be insufficiently distinct from *Phaseolus* to merit generic status. Several species of the two former genera are consequently transferred to the latter genus.

1344. ROZYSKI, H. VON. 635.655.00.14(46)

Erfahrungen im Soja-Anbau. (**Experiences in soya bean cultivation**).

Mitt. Landw. 1943 : 58 : 889-90.

An account is given of trials of soya bean in Spain and U.S.A. and its cultivation in Rumania. The object in the Spanish experiments was to isolate by selection those varieties best suited to Spain and Andalusia in particular. The material included seed from the Agricultural Institute

at Jeréz de la Frontera and 12 different varieties of breeder's seed from Germany. Owing to persistent drought many of the varieties failed to germinate, but Bitterhoff's early, medium high, yellow CSS, Braune 328 (Brown 328), Wilson (from the Radicin Institute, Westerade) and Mönch (Monk) from the firm of Heinemann of Erfurt did well.

Though the weather and other conditions were unfavourable, it was of interest to record that the soya bean, without having been acclimatized, succeeded in growing under the experimental conditions at all.

Brown 328 shed its seeds on ripening but was kept on as a green fodder plant, owing to its abundant foliage.

In Rumania the varieties grown on a large scale are Reiner from pre-war Yugoslavia and the Small Yellow Hungarian. Their cultivation and place in the rotation are discussed.

1345. BURLINGHAM, E. V.

635.656:575"793"(73)

N.W. Wonder pea for Dixie.

Sth. Seedsman 1944 : 7 : No. 5 : 11, 46-47.

A newly developed strain of Austrian winter peas is described. It is known as FG 31599 and is remarkable for its early maturation.

1346.

635.656:575.116.4:576.356.2:582

RÖSEN, G. VON.

635.656:575.127.2

Artkreuzungen in der Gattung *Pisum*. Insbesondere zwischen *P. sativum* L. und *P. abyssinicum* Braun. (**Interspecific crosses in the genus *Pisum* : In particular between *P. sativum* L. and *P. abyssinicum* Braun.**)

Hereditas, Lund 1944 : 30 : 261-400.

A genetical and cytological study has been made on about 30 cultivated varieties and 7 wild races of *P. sativum* and on *P. abyssinicum*. Studies on the mode of inheritance of 28 genes were made in the cross *P. abyssinicum* x *P. sativum* and it was found that, in general, a 3 : 1 monomeric segregation was obtained in the F_2 although there was a distinct tendency for a deficit of double recessives. This may possibly be due to the reduced vitality of such forms.

Details on the mode of action of several of the genes and of their interaction are given, and a new gene *up*, determining one pair of leaflets per compound leaf, is described; it occurs in *P. abyssinicum*, *P. fulvum* and *P. humile*.

Dominance effects are usually clear-cut except in the case of quantitative factors; the heterozygotes of these last-named genes tend to be intermediate. Reciprocal crosses are equivalent in most respects but the number of recessives is less in the case of *P. abyssinicum* ♀ x *P. sativum* ♂ than in the reverse combination. It is suggested that the cytoplasm of the first species provides a less favourable environment than the second.

Linkage studies on 142 gene combinations, 56 studied for the first time, are reported. In 58% of cases, the cross-over values were the same for *P. abyssinicum* and *P. sativum*; in 29% of instances, the value was higher in the first species and in 13% of instances, higher in the second. Several combinations showed a cross-over value higher than 50% and possible explanations for this occurrence are discussed.

Gene maps have been constructed for chromosomes I to VI of *P. sativum*:—

- I .. *d-p₂-O-i-re-fa-z-uni-m-mp-f-b-am-p₁-st-k-s-w* _b,
- II .. *bt_a-le-v-p-wlo-pl-fl*,
- III .. *a-xa-ll-r-pa-q-cp₁-n-bt* _b,
- IV .. *oh-ar-bl*,
- V .. *gp-cp₂-fs-ast*,
- VI .. *lb³-td*.

Pollen fertility of the varieties and their hybrids was investigated and related to their cytology. There is some evidence suggesting the operation of genetical factors, also of heterosis.

Cytological investigations have shown that the different varieties differ *inter se* in respect of translocations and inversions. In the cross of *P. abyssinicum* x *P. sativum*, a 4-chromosome figure is usually formed and is believed to indicate a reciprocal translocation between chromosomes I and III. In other instances, bridges and fragments were formed at anaphase I, as well as lagging chromosomes. A ring of 4 chromosomes is frequent in the hybrid of *P. tibeticum* x *P. sativum* and a single association of 4 chromosomes is found in *P. tibeticum* x *P. abyssinicum* indicating presumably that both of these species have suffered translocation between chromosomes I and III although not involving the same chromosome segments.

Observations on chiasma frequencies are reported and the relation between these and meiotic aberrations elucidated.

Several anomalous plants appeared in the F_2 generation of *P. abyssinicum* x *P. sativum*, including chlorophyll deficient plants and 18-chromosome individuals.

An analysis of pod frequency suggests that heterosis is operative. Seed set varies considerably and is discussed with reference to cytological and genetic factors.

Flowering time was made a special object of genetical study and the following genes were found to be associated with it, in addition to the principal genes *Le* and *Xa* : *Am*, *Tl*, *U* and *R*, and possibly, *Td*, *D*, *F* and *Pl*. The association may be due either to pleiotropy or linkage. *P. abyssinicum* is believed to owe its early flowering habit to the modifying action of a group of quantitative genes since the main genes involved, *Le* and *Xa*, are the same as in *P. sativum*.

The final sections of this paper discuss the relation between these findings and the taxonomy of the genus. *P. abyssinicum* is thought to be specifically distinct from *P. sativum* on account of its morphological peculiarities, its cytological characters, its special block of quantitative genes and its geographical isolation. *P. fulvum* and *P. humile* are probably more closely related to *P. abyssinicum* than to *P. sativum* and these and the other wild varieties mentioned might also be admitted to specific status.

1347. WELLENSIEK, S. J.

635.656:581.48:575.113.36

Pisum-crosses VI : seed-surface.

Genetica 1942 : 23 : 77-92.

The interaction of gene pairs *A a*, *R r* and *Di di* in the determination of seed surface characters has been studied. Gene *A* causes an indented seed surface in contrast to the smooth testa of *a*. *R* and *r* determine smooth and wrinkled cotyledons respectively and *di* gives rise to dimpling in the presence of *a*. Wrinkling, determined by *r*, is epistatic to all other characters while indenting (*a*) and dimpling (*di*) are epistatic to the smooth phenotype of *R*. These relationships are not regarded as genetic but as examples of morphological epistasy, the various analogous phenotypes being mutually exclusive.

A new gene *Ro* has been found controlling flattened seed shape in contrast to smooth. Tentative linkages are suggested for all these genes and the concept of a "temporary periclinal chimaera" is invoked to cover the differences in reciprocal crosses where cotyledon, endosperm and testa characters interact.

BOOK REVIEWS

MEČNIKOV, I. I.
(On Darwinism).

576.12

Academy of Sciences of U.S.S.R., Moscow-Leningrad 1943: Pp. 242.

This book contains mainly (213 pp.) the first republication in its entirety of Mečnikov's essay entitled "An outline of the question of the origin of species" which appeared by instalments during 1876 in the Russian monthly magazine "Vestnik Evropy". This work deals with the general implications of Darwin's theory and is prefaced by several chapters devoted to the exposition of views, on the same subject, by Bonnet, Linnaeus, Pallas, Lamarck, Cuvier, Müller, Matthew and other scientists of the 18th and 19th centuries. In addition to the above, the book includes a chapter from Mečnikov's "Studies on the nature of man" devoted to the hypothesis of the descent of man from the ape; an article entitled "Darwinism and medicine"; and an account, hitherto unpublished, of the Darwin centenary celebration held in Cambridge in June 1909 where Mečnikov, as an official delegate of the Pasteur Institute of Paris, made a speech.

H. F.

DADE, H. A.
Colour terminology in biology.
Mycological Papers No. 6.

578.08

Imperial Mycological Institute, Kew, Surrey 1943: 3s. 9d. Pp. 21. 2 charts.

This excellent booklet attempts to bring order into a rather chaotic field of biology, namely, that of colour definition. Since colour conceptions vary markedly with different people and under different circumstances, and especially since many of the Latin and Greek names given to colours were extremely vague and did not necessarily correspond with the colours denoted by their English translations, the whole question of colour terminology in the biological field was obviously in need of standardization.

The author has made a valuable contribution in this vexed field, basing his paper mainly on the classic works of Ridgway, Saccardo and Wharton. He has not, however, produced a mere compilation of the results of these authors but has given us a critical monograph in which the best and most appropriate names are sifted from those that are estimated to be too vague and inaccurate for detailed scientific usage.

Two lists of words are included, the first dealing with colour names in Latin and English, the second giving the qualifying adjectives that indicate purity, tone, sheen, etc. This second list also includes words both in Latin and English.

As an appendix the author shows two charts, the first linking up the colours of Saccardo and Ridgway with the author's own system, the second arranging the Latin and English colour names retained as valid into a complete chart.

Two minor criticisms might be levelled at this work. In the first place it might have been better to place the English and Latin colour names separately in the two lists. Secondly it seems a pity that the work has not been linked to more modern colour charts such as that prepared recently by the Royal Horticultural Society, since to most workers in biology the books of Ridgway, Saccardo and Wharton may not be available. Short of this the author might have included colour samples in his own work, though it is realized that these would probably have rendered the price too high.

With the exception of these minor points, however, the work is of undeniable utility to every biologist who wishes to define colours as easily and accurately as he has been able to define the more easily measurable attributes of living organisms such as size and weight.

J. G. H.

CHESTER, K. S.
The nature and prevention of plant diseases.

632

Blakiston Co., Philadelphia, Pa 1942: \$4.50. Pp. xii + 584. 12 tables.
207 figs.

This is a comprehensive and well-planned text-book, with a profusion of good illustrations and a high general standard of production. The arrangement is unusual: specific diseases are dealt

with in the first fourteen chapters, leaving the last six to the discussion of general principles. It is claimed that this arrangement, accompanied by the author's selection of economically important diseases of leading crops for detailed discussion, succeeds in capturing the interest of a student with a practical, rather than academic, background. After learning about important diseases he has met in the field, and their control, such a student is more receptive to generalization and theory. While this is probably true, one would have thought that many students would be appalled, rather than intrigued, by the complexities of the rust fungi presented at the beginning of a course, without previous discussion of simpler life histories.

Treatment of individual diseases is clear and concise, and includes in most cases a list of resistant crop varieties. Careful instructions for control are given throughout. There are many helpful diagrams and photographs. Diseases caused by fungi, bacteria, viruses, parasitic seed plants and algae, nematodes and also physiogenic diseases are all included, each with a wide range of specific examples.

One of the later chapters deals with the control of disease by the use of resistant varieties and the achievements of the plant breeder in this direction are outlined. Coon's 1937 estimates of the advances made up to that date are quoted: an increase in American farm income of from 60 to 70 million dollars a year, due to the use of resistant varieties in 17 farm crops.

This is a book which can be recommended as a sound introduction to plant disease problems for the practical agriculturalist, and also as a handbook on the control of plant diseases. S. E.

632.8:001.4

Virus names used in the Review of Applied Mycology.

Imperial Mycological Institute, Kew, Surrey 1944: 1s. 0d. Pp. 44. (Mimeographed).

Since no internationally accepted system for the nomenclature of viruses has yet been evolved the Review of Applied Mycology has refrained from adopting any system for their "scientific" nomenclature of viruses. The practice so far has been to index viruses under the English common name of the particular *diseases* caused or some other designation in wide use. These common names are accepted throughout the English-speaking world, are often unambiguous and will presumably still be used even after internationally acceptable scientific names have been agreed upon. It has therefore been decided that except in a few cases, viruses should be indexed under the English common name of the diseases caused by them. In an endeavour to standardize disease names numerous workers on viruses and official plant pathologists have been consulted and the present tentative list, which also includes important synonyms, incorporates their suggestions.

Criticisms and suggestions will be welcomed as a contribution to a revised, adequately indexed and printed version of the list which it is hoped to issue at a future date.

633.2

***Imperata cylindrica*. Taxonomy, distribution, economic significance and control.**

Imperial Agricultural Bureaux Joint Publication, Great Britain 1944 : 2s. 6d.
No. 7 : Pp. 63.

Imperata cylindrica is a widely distributed grass in tropical and subtropical regions and has become a matter of concern to the agricultural authorities who have encountered it. This publication by the Imperial Forestry Bureau and the Imperial Bureau of Pastures and Forage Crops has assembled a wide range of factual information relating to this species, including accounts of its taxonomy, natural variation, cytology, anatomy, reproduction and ecology. Generally speaking, this grass is a serious weed acting deleteriously on economic crops, and it is necessary to control it by various methods which are described in detail. There are, however, a number of uses to which it may be put, and these include grazing, thatching, paper making and soil conservation. Plant breeders will be interested particularly in the brief account presented of *Saccharum* x *Imperata* hybridization.

As a reference work this bulletin should prove of considerable service. There is a list of vernacular names of the grass and an extensive bibliography.

WEBBER, H. J. and

634.3

BATCHELOR, L. D. (Editors)

634.3:575

The citrus industry. Vol. I. History, botany, and breeding.

University of California Press, Berkeley and Los Angeles 1943: \$7.50.

Pp. xx + 1028. 233 figs. 52 tables.

This book is the first of a series of three, designed to cover every phase of the citrus industry with particular reference to the United States of America but including much information from other citrus growing regions of the world. It consists of ten sections written by members of the staffs of the California Citrus Experiment Station and citrus workers of the United States Department of Agriculture. The first three sections deal with the history and development of the citrus industry, the growth characteristics and climatic requirements of citrus species and give a description of the principal citrus growing regions of the world. The next section, on the botany of the citrus family, occupies over 340 pages of the text and is the most exhaustive account published for many years. A further 190 pages are used to describe the cultivated varieties of citrus, not only their botanical or growth characteristics, but climatic, soil or other requirements, and an interesting account is given of the development of a number of promising hybrids by American citrus breeders. Other sections deal with the morphology, histology, physiology and mineral nutrition of citrus species, and the last three sections are devoted to the problems of reproduction, with emphasis upon polyembryony and bud selection, and to the breeding of new varieties. As individual sections were written by different authors at the same time there is some overlap of material and some slight variations in treatment, particularly in the classification of the hybrid types. However, these are minor defects that do not detract from the book as a record of what has been accomplished over the past 50 years and as a work of reference that will remain the standard for years to come. The general plant breeder will find much of interest in this volume, while those engaged in the growing or breeding of citrus fruits can hardly afford to be without it. The bibliography contains nearly 1200 references, there are numerous illustrations, and the paper and binding are very good. C. M. D.

NEW JOURNAL

The Queensland Journal of Agricultural Science.

This new quarterly journal is published by the Queensland Department of Agriculture and Stock, Brisbane. It has been established for the purpose of printing scientific contributions by the officers of the Queensland Department of Agriculture and Stock, whose researches were formerly published in the Queensland Agricultural Journal and the Technical Communications of the Bureau of Sugar Experiment Stations. The first number contains articles on applied plant physiology and ecology and it is to be expected that later numbers will include papers of direct interest to plant breeders. The journal will be supplied free to scientific, agricultural and veterinary institutions and is sold to private individuals at two shillings and sixpence per number.

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